ENGIN. LIBRARY

RR

UNI... OF MICHIGAN
OCT 17 1952
ENGINEERING LIBRARY

SEPTEMBER 1952

VOLUME 1, NUMBER 9

Battelle Technical Review

BATTELLE MEMORIAL INSTITUTE

ADAMS LECTURER

CONSTANTINE B. VOLDRICH

Constantine B. Voldrich will present the 1952 Adams Lecture, "On the Welding of Titanium Alloys", before the American Welding Society on October 20. This annual lecture was established to honor Comfort A. Adams, one of the pioneers of modern welding.

Dr. Adams first entered the field when welding was used primarily for repairing damaged railroad equipment. But as chairman of the Welding Committee of the Emergency Fleet Corporation during World War I, he helped introduce welding into shipbuilding. Later, Adam's work was recognized by his appointment as first director of the American Bureau of Welding and by his selection as the first president of the American Welding Society. When the Welding Research Committee superseded the Bureau, Adams became its chairman.

The function of welding technology is to make two or more pieces of metal act as one. It was natural, therefore, that welding should become one of the chief methods of fabricating metal products. But, its widening use created many technical problems. The welding industries had to turn to metallurgy, ceramics, chemistry, physics, and electronics for help. Finding the most efficient ways of welding various metals also forced technologists to consider problems of design, fabrication, stress, serviceability, and economics.

At Battelle, much of what Connie Voldrich has contributed to the science of welding has resulted from his cooperation with research men who are specialists in fields other than welding technology. He is willing to attack a problem by any means that promises a solution. With this open-mindedness, he and his colleagues have helped advance the welding of steel, have played a key part in solving some of the problems of welding aluminum, molydenum, titanium, and other metals, have contributed to the development of new welding procedures and processes, and have done significant work in the design and fabrication of new products where welding is a part of the problem.

Connie received his first taste of welding while working for his Bachelor's degree at Purdue University and his Master's degree at the University of Wisconsin, where he majored in structural engineering and metallurgy. Of his research jobs before joining Battelle in 1941, two were in the welding field. He was a research engineer with the A. O. Smith Corporation, pioneer in the development of welded products and materials for welding. Later, he was with the Bureau of Ships when the Navy began extensive welding of its ships.

Connie's decision to lecture on the welding of titanium indicates his interest in the new field. Because of its qualities, the metal is wanted in a hurry by the military and by aviation, chemical, and other industries. But the all-important welding techniques have not yet been perfected—a challenge to Connie and to all welding technologists.

Volume 1, Number 9
September 1952

BATTELLE TECHNICAL REVIEW

Dedicated to the dissemination of knowledge. Published monthly by Battelle Memorial Institute, an endowed foundation serving mankind through science and technology

Published monthly by Battelle Memorial Institute. Please address all correspondence about articles, abstracts, subscriptions and exchanges to: The Editor, Battelle Technical Review, Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio. Acceptance under Section 34.64 P. L. & R. authorized. Printed in the U. S. A.

contents

Adams Lecturer . . . . . Inside front cover

Individuality in Group Research 95

An Editorial

Trace Minerals Mean Better Health 96

by Frank A. Gilbert

Research shows that small amounts of certain minerals may be one key to a better-fed and healthier world.

Nondestructive Testing 98

by Samuel A. Wenk

The need for greater economy, efficiency, and safety is making nondestructive testing increasingly important in many industries. Tests can be devised for most products on the basis of existing techniques.

Notes from Battelle 103

Reports on research subjects of interest to science and industry.

Recent Papers by the Research Staff 105

Papers and articles prepared by members of the Battelle staff that have appeared recently in books and periodicals.

Battelle Technical Review Abstracts 633a

Abstracts of articles from more than 900 American and foreign technical journals in a wide variety of technological fields.

Engineering Lit
Gift
10-10-52

Individuality in Group Research

Practically all research done by large organizations today is group research, which means that specialists in varied technologies and sciences combine their creative efforts to produce the desired end results. When a study is completed, the accomplishments, including patents and other useful assets, represent accomplishments of the entire research group, rather than of the individual. This leads to questions regarding the place of the individual in this type of cooperative research.

One question frequently asked pertains to the opportunities for professional development under group research. Another relates to the incentives to be found in group effort. Still another is concerned with the particular requirements for individual success in modern research establishments.

The experience of research institutes and large industrial laboratories indicates that group research enhances individual opportunities. Science is so complex today that there is little probability of even the most brilliant inventor duplicating the careers of Edison, De Forest, Burbank, or Hall. Success, both from the standpoint of professional recognition and monetary return, is most likely to come with opportunity for uninterrupted practice of a specialization. An alloy development metallurgist would have little time left to pursue his prime interest if he had to develop basic physical and engineering theory; run his own chemical analyses; grind and polish his own specimens; and personally handle tensile, fatigue, and creep evaluations. Working closely to his specialization, however, he can rapidly build a reputation for his knowledge of alloys and rise to a more lucrative position. Similarly, the physicists, engineers, chemical analysts, metallographers, and experts on fatigue and creep who work with him can build reputations in their specializations.

Cooperation makes research more efficient and leads to continual growth. With growth comes increased responsibilities for the individual and opportunities to rise into positions of leadership. The chances of individual success, both professionally and materially, are closely associated with growth.

Large laboratories, made possible by the proved efficiency of cooperative research, affect individual development in yet another way. They are able to provide what to the individual would be almost a "luxury" of equipment and tools. They can support the necessary libraries and other research services required for effective creative effort. The individual, struggling alone with makeshift and antiquated equipment, would have little chance for winning his place in present-day, complex science. Large organizations also are able to support the individual's publication and professional society activities, giving him open doors to recognition.

Patents resulting from group research in large laboratories do not, of course, usually become the property of the scientists who combine their efforts to develop the inventions. This, however, need not be a reason for lack of incentive. The workers who build a building do not usually own the finished structure. There is just as much incentive for a group of scientists to develop a usable patent for their employer as there is for a group of tradesmen to build a usable edifice or workable machine for their employer. The scientist strives also to make permanent contributions to science.

The particular personal requirements for individual success in cooperative research are many. The scientist working day-by-day in close contact with others needs much more than a good training in his field. He must have the selflessness to help others and the ability to get along with people. He needs a broader personality development than formerly, and, because he has opportunities to rise to high administrative and management positions, should also have broader general knowledge and perspective. Our colleges and engineering schools today are well aware of the changed requirements and in recent years have been altering their curricula so as to give young scientists and engineers the training they need.

Clyde Williams

Director, Battelle Memorial Institute

Trace Minerals Mean Better Health

by FRANK A. GILBERT

Dr. Gilbert has been closely identified with research on the effects of metals and chemicals in agriculture, and is known as the author of the book, "Mineral Nutrition of Plants and Animals." After receiving his M.A. and Ph.D. from Harvard University, he served successively as plant pathologist with the U. S. Department of Agriculture and as professor of botany at Marshall College. He joined the Battelle staff in 1944. He has published more than forty papres on plant nutritions, mycology, and botany.

THE WORLD'S food problem may be divided into two parts. First, greater quantities of food must be made available from a diminishing land acreage to feed steadily increasing populations. Second, in the face of widespread malnutrition, higher quality, or more nutritious, foods must be produced to maintain and restore human health. A plentiful and balanced supply of the required nutrient elements in the many varieties of soils can contribute greatly to solving this twofold food problem.

Much progress has already been made in the mechanization of farming, in the creation of better types and uses of crops and livestock, in crop protection, and in soil improvement. Unconventional methods for increasing the food supply, such as exploiting the resources of the sea, are being explored. Each of these levels of agricultural research has its place in solving the over-all food problem. Soil improvement, at least at present, is perhaps the most basic of all. Our health, even our survival in a free world, rests on adequate nutrition. This can be ours only if it stems from soils that are not minerally deficient.

Soil scientists and farmers are becoming conscious that it takes more than NPK (nitrogen, phosphorus, and potassium), water, and sunshine to make a good crop. Nearly a score of different mineral elements must be supplied to produce a normal and healthy crop, animal, or man. Many of these elements, like copper, iron, cobalt, zinc, manganese, and boron are needed only in very small amounts, but without them there could be no life.

All vital processes, from reproducing and growing to thinking and dreaming, are controlled by enzymes. At the heart of each enzyme is one of the elements in question. In plants the all-important function of chlorophyll requires copper, iron, and magnesium. Boron, manganese, and zinc also are necessary for plant growth. Sulfur is required in plant proteins. Swayback, anemia, and other poor-growth conditions in livestock have been traced to the lack of essential mineral elements in the animals' diet.

An outstanding example of how a minute amount of a trace element can mean the difference between health and sickness in livestock is found in the case of cobalt, recently proved to be a part of the vitamin B_{12} molecule.

From Sickness to Health

The occurrence of a disease of sheep and cattle characterized by anemia was long associated with certain land areas and a recognized cure was to shift the animals from a "sick" pasture to one known to be "healthy". An early, and still useful, treatment was to add crude iron salts (limonite) to the feed. As this resulted in a cure, the disease was for a long time ascribed to an iron deficiency. It was later found, however, that if pure iron preparations were used, a favorable response was seldom obtained; and when post-mortem examinations of the anemic animals revealed that the liver and spleen were filled with extra stones of iron, a deficiency of some other element was suspected.

After some experimentation with copper, frequently a factor in anemia, and with other elements present as impurities in limonite, it was found that cobalt was the missing element. With this in mind, investigators of livestock anemias evaluated their data and pursued with renewed interest the case not responding to the usual treatments.

In many instances, in different parts of the world, anemias passing under many different names showed a similar and amazing response to cobalt whether given directly to the animal or applied to the deficient land. Even more surprising was the small amount of the element necessary to effect a cure. Sheep were found to recover completely with daily intake as small as one ten-thousandth of a gram, and an application of as little as 800 grams or about twenty-eight ounces of cobaltous sulfate per acre made "sick" pasture "healthy" for the animals feeding there.

Likewise in humans, iron, copper, and cobalt are necessary for the hemoglobin of the blood. Iodine is

essential to the thyroid gland, zinc to insulin, and manganese to the pituitary and sex glands. Frequently, a few parts per million of these and other mineral elements in our diet is all that stands between us and ill health.

There is increasing evidence that the health of people is directly associated with the condition of the soil which sustains them. Such evidence, for example, may be seen in the iodine-deficient goiter belt of Minnesota and adjacent territory; in the high incidence of anemia in Florida children where the soil is deficient in iron, copper, and cobalt; and in the correlation between health and soil composition in different parts of India.

Areas of Deficiency

In some areas a sufficient amount of a trace element may be present in the soil but is made unavailable by factors such as extreme acidity or alkalinity, undesirable microbiological activities, excessive organic content, or by a superabundance of some other element which upsets mineral balance. Each of these factors, although producing the same effect, may require a different treatment.

There are areas of such acute mineral deficiencies that crops and livestock cannot be grown until the needed elements are added or restored, as in parts of Florida and California.

The Atlantic Coastal Plain at one place or another has shown an actual deficiency of every known nutrient trace element except iodine. The Gulf States and some western states, including those on the Pacific Coast, show a general deficiency of zinc. Peat soils throughout the country respond to copper and manganese treatments, while boron deficiency is so prevalent that it is the usual practice to add boron to fertilizer used on alfalfa and clover fields.

Numerous as are the areas of pronounced trace-element deficiency, they are far fewer than the areas of marginal soil deficiency where fair growth is obtained and where deficiencies are not apparent until complete fertilization results in increased vigor of growth. Since lessened growth is the first and sometimes the only symptom of incipient trace-element deficiency, in these thousands of cases the amount of costly lost growth is not known.

Because two areas of agricultural land produce equal amounts of food, it does not follow that this food is of equal nutritive value. Leguminous crops make more satisfactory rations for cattle than nonleguminous ones. But on fertile soils, timothy and other nonleguminous hays furnish good mineral nutriment, while on deficient soils even legumes may not supply sufficient minerals for animals.

It has been shown that, in general, the soils of the United States west to the Rockies show an increasingly higher mineral content the farther one goes from the Atlantic Seaboard. The same is true as one goes from the Gulf of Mexico northward. This does not mean, of course, that all eastern and southern soils are deficient and that all northern and Great Plain soils are fertile. It does mean that trace-element deficiencies tend to be more pronounced on the coastal plain areas and less frequent on the Great Plains and in the Midwest. Similarly, west of the Rockies the most pronounced areas of deficiency are on the Pacific Coast.

What can restoration of soil fertility mean to agriculture? First, it means more and better crops of livestock, and with these, greater income to the farmer. The Borders farm in Kentucky, Louis Bromfield's Malabar Farm in Ohio, and many others over the United States, where a program of complete fertilization has been adopted, show abundant increases in yields over those that had formerly been considered normal for the areas. Spectacular gains in livestock production have also resulted.

Complete fertilization can also restore to usefulness acreage that is considered unsuitable for agriculture. For instance, there is a 90-mile stretch of land in Australia which cannot be farmed because of a lack of phosphorus, copper, and zinc. These are now being applied and the area is being transformed into good agricultural land.

Perhaps most important is what complete soil fertility can mean to society as a whole. The population of the world continues to increase at the rate of 20,000,000 per year, while the amount of arable land decreases. It has been estimated that half of the world's population, or over 1 billion persons, is either starving or undernourished. More fertile soils could support population increases for many years and at the same time could minimize malnutrition.

In recent years, the importance of a balanced, adequate supply of minor elements in the soil in available form has been rapidly passing from speculation to constructive action. Complete mineral analysis, at reasonable cost, may soon be within the reach of every farmer, doctor, and nutritionist. We are looking forward to the establishment of a national analytical service designed to perform a great number of the needed analyses with the speed and economy of the modern industrial production line. The cost of establishing such a national analytical service will be a mere fraction of its cash value to agriculture and human health in the United States. Adoption of such a service by other countries could go a long way toward stemming the tide of hunger and suffering which promotes unrest and world conflict.

Nondestructive Testing

by SAMUEL A. WENK

After graduation from Virginia Polytechnic Institute, the author served as a metallurgist in the steel industry. During the World War II years, he was in charge of the large inspection operation of the Pittsburgh Ordnance District which made use of all known methods of nondestructive testing. The author joined the Battelle staff in 1948. Two years later he took over direction of much of the nondestructive testing research there.

"For want of a nail, the shoe was lost
For want of a shoe, the horse was lost
For want of the horse, the rider was lost
For want of the rider, the battle was lost
For want of the battle, the kingdom was lost
And all for the want of a horseshoe nail".

THE INSPECTION philosophy Benjamin Franklin expressed in *Poor Richard's Almanac* in 1785 holds true today. For want of strength in a part, a tank, a plane, a locomotive, or a machine tool may be lost. And in today's heavily mechanized industry, parts failures may cause heavy loss.

Why does a part or component fail and how may defects best be detected? Assuming that calculated design stresses are not exceeded, failure occurs becaeuse the component is defective in some manner. Defects which cause failures are many. They are usually characteristic of the material used and the method of its processing. Detection of most defects can be accomplished by nondestructive testing.

In addition to this use for inspection of finished components, nondestructive tests are applied by industry to the inspection of raw and semifinished materials. This eliminates costly finishing operations on defective parts.

What Is Nondestructive Testing?

As the name implies, nondestructive testing is the testing of a part for structural change or damage without harm to the part being tested. Basically, such tests have five essential features:

1. Supplying energy of a suitable form and distribution from an external source of the test object.
2. Modification of the energy distribution within the test object by the defects in the material or variations in the material properties which correlate with serviceability.
3. Detection of the change in energy properties by a sensitive detector.
4. Indication or recording of the energy measurement from the detector in a form useful for interpretation.
5. Interpretation of the energy indication, and judgment of the corresponding serviceability of the test object.

The practicality and effectiveness of a proposed nondestructive test method must be evaluated by a full consideration of each of these essential phases.

Types of Nondestructive Tests

Nearly every form of energy has been utilized at one time or another for nondestructive testing. Recent literature and patent surveys indicate the invention and application of hundreds of tests. However, most of such described tests are specific to one application, and, aside from that, are as inflexible as the laws of the Medes and the Persians. Since there are no Medes left, and relatively few Persians, history points to the need for flexibility. The balance of this article will be confined to tests whose flexibility has made them commercially successful. Space limitations necessitate that the description be extremely brief and basic.

Light

The oldest forms of nondestructive testing use tests which employ luminous energy from the visible spectrum. The most common and elemental form of this type of test is the visual inspection of a part by using natural or artificial light. In this case, the human eye is the detector, and the human brain is the recording as well as the interpreting device. These methods are slow and laborious.

High-speed production, and parts whose geometries are not suitable for direct visual inspection, have resulted in special instrumentation. For example, the accompanying illustration shows a specially designed boroscope which is used for inspecting the inside surfaces of oil-well drill pipe for pitting, fatigue cracks, and corrosion-fatigue cracks.

In many cases, photoelectric pick-up methods have

been substituted for visual observation, in order to combat the problem of inspector fatigue. One such method, developed at Battelle for the Magnaflux Corporation, automatically scans fluorescent indications produced by either fluorescent magnetic particles, or by fluorescent penetrants. Scanning is accomplished by a wobbling mirror in an optical system. It sweeps reflected light from the indication through a filtering system and on to a photomultiplier tube. Electronic amplification can actuate marking or rejection devices.

Radiography

Industrial radiographic inspection is now in widespread use on a variety of materials and test objects. Fundamentally, this method utilizes a beam of penetrating radiation, or a field of high-intensity particles, capable of passing through the test object. The intensity of the beam is modified by passage through, or reflections from, the materials and defects in the test object. The differential absorption of the beam is a function of the material structure, density, mass, thickness, and other properties of the test object. The modification of the beam is detected by X-ray film, fluorescent screens, xeroradiographic plates, Geiger tubes, crystal counters, and ionization chambers. These detectors transform differences in intensity of radiation into visible signals or electrical signals.

Fluoroscopy, although it does not possess the definition and contrast of film radiography, is being widely used in the aircraft industry for the inspection of light-alloy castings. High-brightness rotational fluoroscopy, in which the test object moves relative to the tube and to the observer, has the advantage of allowing more complete examination of a part than is possible with film radiography. Where a large number of parts must be radiographically inspected, fluoroscopy can be used to great economic advantage as a preliminary screening operation.

At the present time, research is being conducted by several laboratories on the possibilities of electronic reproduction of X-ray images. Xeroradiography is being investigated at Battelle as a possible substitute, in many applications, for X-ray film. Ionization gages and Geiger counters are used as detectors on many X-ray and nuclear thickness measuring devices. Semiconductor heads such as those made of cadmium sulfide have been used as detectors for checking the continuity of the powder train in blasting fuses.

Magnetic and Electric Tests

Over 200 such nondestructive tests have been patented. Relatively few have been commercially successful. Some successful ones will be described briefly.

Magnetic-Particle Testing

The magnaflux, or magnetic-particle, method shown on the next page, depends for its operation on the fact that a crack or other discontinuity in a magnetized piece of ferromagnetic material distorts the magnetic field. This causes crowding or deflecting of the flux lines around the ends of such a magnetic obstruction. If the obstruction lies near enough to the surface of the material, some of the flux lines will be crowded outside the material itself, and a magnetic leakage field is produced at the surface at a point over the discontinuity. The closer the discontinuity is to the surface, the stronger is the leakage field—and in the case of a surface crack, the field is quite strong and highly localized.

If a powder of fine particles of a magnetic material, either dry or suspended in a liquid, is applied over the surface in the vicinity of a leakage field, some of the powder will be attracted and held by the leakage field. This produces a magnetically held pattern which outlines the discontinuity.

Magnetic Analysis Methods

The original magnetic analysis methods have been improved and extended during the past 25 years. An

The special boroscope or "tuboscope" is used for the visual inspection of the interior of oil well drill pipes. (Courtesy of Tubular Service and Engineering Company).

Magnaflux inspection is being performed here by the prod method, using a portable half-wave rectified unit. The magnetic current is passed through the prods, while the magnetic powder is applied by the air gun in the left hand of the man on the right.

extensive line of more or less standard equipment is available for the inspection of tube and bar stock. It usually can be specially engineered for particular applications. Automatic handling equipment is available for passing the tubes or bars through the induction and detection-head units. Very sensitive discrimination circuits, which operate on a variety of principles, and which subject the signals to repeated tests and checks, have been developed for commercial units. These units may indicate the presence of defects or discontinuities by visual or audible signals, by marking the test objects, or by external records, as desired. The method has been proved under production conditions as a reliable means for detecting seams and laps in rolled and pierced steel tubing. It is sensitive to subsurface cracks in steel tubes and bars, and responds to many defects which lie so deep within the material as to be difficult to reveal by magnetic-particle inspection.

Cyclograph Method

In the Cyclograph technique of nondestructive testing, the test object is placed within a single search or detection coil. The coil is supplied with high-frequency alternating current from a suitable oscillator. The rapidly varying electromagnetic field induces eddy currents and varying magnetic fields within the test object. The total losses, both electrical and magnetic, within the test object serve to load and to partially detune the oscillator. The amplitude of the oscillation is recorded on a cathode-ray oscilloscope. The Cyclograph, in this form, is primarily applicable to the rapid sorting of test objects of similar geometry, such as bolts and machined parts.

Triboelectric Tests

Triboelectric energy and static electricity only recently have been adapted to the field of nondestructive testing. The triboelectric phenomenon involves friction between two unlike materials in intimate contact and the generation of an electrostatic charge on the contacting surfaces.

At present, there are two commercially available types of nondestructive testing equipment which utilize triboelectric energy. The Metal Sorter operates by the measurement of the static charge produced by the friction of metals against a standard piece of metal. The Statiflux method, shown in the photograph, utilizes a spray of electrified particles.

Ultrasonic Testing

Ultrasonic sound waves (above the audible range of 20,000 cycles per second) have characteristics which make them very useful for materials inspection. Their short waves are reflected from small flaws whereas audible sound, with long wave lengths, flows around and past flaws without appreciable directional reflection. Another useful property of high-frequency, short-wave length sound is its ability to travel in a straight line with a searchlight effect, instead of scattering and bending around corners, as does audible sound. Further, ultrasonic waves are able to penetrate thicker sections of materials such as steel and aluminum. Because of these properties, it is possible to use ultrasonic waves to examine the interior of thick materials and locate accurately any discontinuities present.

Two basic methods have been developed for utilizing ultrasonic energy for the inspection of materials. They are the reflection method and the resonant-frequency method.

Reflection Method

It is a well-established fact that materials such as metals, plastics, and liquids transmit sound better than does air. When ultrasonic waves are transmitted through a piece of solid material and hit the boundary between solid and air, the waves are practically stop-

ped and reflected back toward their point of origin. Also, if a discontinuity (void) exists in the material, the portion of the beam hitting it will be reflected.

This reflection, or echo principle, is used in the ultrasonic Reflectoscope. It opeartes as follows. An electronic generator creates ultrasonic waves by supplying a high-frequency a.c. voltage pulse to a quartz crystal. The crystal radiates these waves into the material and also acts as a receiver to detect reflections. An electronic amplifier applies the reflected signal to a cathode-ray oscilloscope, which measures the time interval between transmission of the outgoing and reception of the incoming waves. A typical screen pattern will show two peaks, one representing the initial pulse or surface of the material, and the other representing the reflection from the other side. A discontinuity will result in a "pip" occurring between the two peaks. A calibrated square wave can be superimposed on the screen to locate the discontinuity accurately.

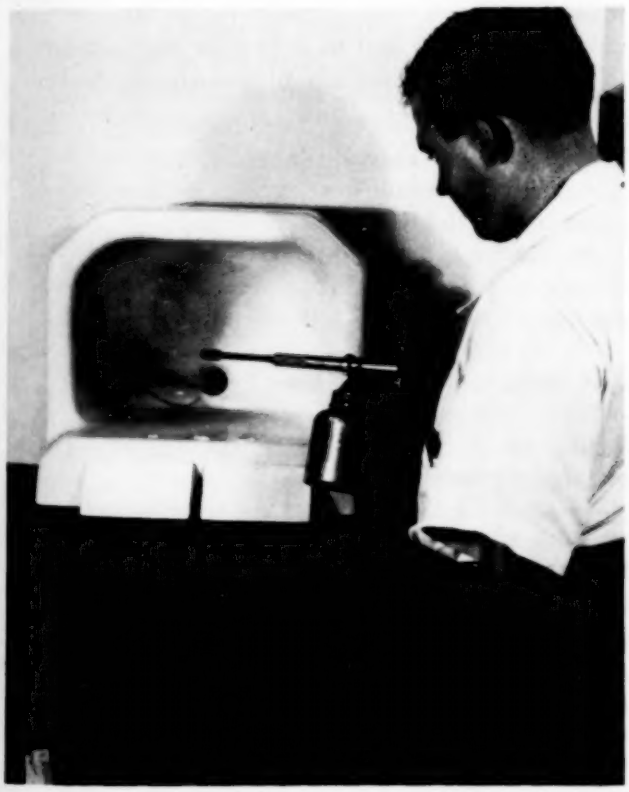
Resonant-Frequency Method

There are now several resonant-frequency ultrasonic instruments on the market. The majority of them are used for thickness measurement. Basically, they consist of a simple electronic oscillator which supplies voltage at ultrasonic frequencies to a piezoelectric crystal. The crystal probe is pressed into contact, through a film of oil as contact medium, with the part to be measured and induces longitudinal vibrations in the piece under the area of contact of the crystal. When the test piece has resonant frequencies within the tuning range, there are, as the condenser tunes through these frequencies, momentary changes in the energy drawn by the crystal. Each change in energy is indicated by a vertical deflection of the cathode-ray beam. The frequency at which this occurs is a measure of the thickness. Most metals have low ultrasonic absorption; consequently, sharp resonance peaks are obtainable.

Accordingly, a thickness indication is obtained corresponding to the ultrasonic frequency which is resonant through the test piece. Direct-reading scales for different materials are laid out over the cathode-ray screen to read in thickness for the material under test.

The Audigage Flaw Detector locates cracks across the webs of railroad rails ultrasonically, within joint-bar limits. A companion instrument, capable of meas-

Inspecting a gear for internal cracks with the ultrasonic Reflectoscope. The left-hand pip on the scope indicates the initial pulse, while the right-hand pip shows the first reflection from the opposite side of the piece. The small pip indicates a defect at about half the depth of the object.



The Statiflux is being used here to inspect a sink for cracks in the porcelain enamel. The powder is blown through a hard rubber nozzle, generating a positive charge of static electricity. Cracks in the enamel allow electrons to leak from the conducting base, thus attracting the positively charged powder. This results in a highly visible indication of the flaw. The method has great sensitivity and reveals cracks of less than a half-wavelength of light.

uring a range of thickness of steel from 1/16 inch to 12 inches, has been developed.

Penetrant Tests

Perhaps the oldest form of nondestructive testing is the penetrant method, in which a penetrating liquid is used in conjunction with a suitable developer to reveal surface discontinuities. The method in its simplest form is the old "oil-and-whiting" method. The penetrant method is a very useful test for revealing surface cracks, pores, leaks, and similar discontinuities in nonmagnetic material where magnetic particle inspection cannot be used.

There are two basic types of penetrant nondestructive tests commercially available, a fluorescent water-washable type and a dye type.

Basically, fluorescent-penetrant inspection makes use of a water-washable penetrant of high fluorescence and unusual wetting or penetrating properties. Because of its low surface tension, it will readily be drawn into extremely small surface openings by capilliary action. The actual inspection operation is done under black light, which causes the indications to fluoresce brilliantly.

The application technique consists first of applying a surface film of penetrant to the areas being inspected, by dipping, brushing, or spraying. The next step is the draining off of the excess penetrant during a time interval required for the penetration of the discontinuities. This is followed by a water rinse and drying. After drying, the indications caused by capillary action are developed by either a dry or wet method.

The dye-type penetrants are used in much the same way as the fluorescent ones, but depend on bright color rather than fluorescence for detection of surface discontinuities.

Because of their many advantages, nondestructive tests are finding very wide use in modern industries. They offer industrial management a direct and potent means of lowering production costs, of improving product quality, and of lowering servicing and operating costs. They serve as a guide in engineering design, as a means of inspecting raw materials, and as a tool for process control. They are being substituted for destructive tests on production samples, since nondestructive tests may be applied to every piece in a production lot and cost far less than ordinary destructive tests. They have become the basic tool in service maintenance in industries where material failures may be catastrophic, as in railroading and air transportation, or in pressure-vessel applications. For these reasons, it pays management to investigate nondestructive testing and to determine the applications in which it can be used advantageously and profitably in their industries.

"Engineering and science are intimately interwoven in the complicated fabric of modern life, for they have, on the one hand, created this new culture and, on the other, the ever-changing economic and social demands of the day are primary incentives to continued and more rapid engineering development."—*James Kip Finch*

Notes From Battelle

RESEARCH—A GROWING INDUSTRY

What is the dollar volume of applied research activity in this country? Unfortunately, we have no accurate figures for answering such a question. An estimate, however, may be found in *Applied Research in the United States*, a recent report made to the Mutual Security Administration by the National Academy of Sciences—National Research Council.

According to this report, over-all expenditure for research and development increased from about $800 million in 1941 to nearly $3 billion this year. This includes expenditures of industry, government, and nonprofit institutions. The increase is not entirely the result of increased activity. Some rise in expenditures, of course, is due to inflation. Some is the result of the more complex equipment being used in research. Another factor is the inclusion as "research" of activities formerly classified as production and design.

The volume of research activity can also be measured by the number of scientists and engineers employed. In 1950, industrial research laboratories employed 70,000 professional scientists and engineers. A 1951 survey found that 13,000 regular staff members and 25,000 graduate students were engaged in part-time research in colleges and universities. This was estimated as equivalent to 19,000 full-time workers. About 6000 research scientists are engaged in medical and biological sciences. Careful estimates of research personnel employed by the government places the figure at 45,000.

The total of these figures indicates that about 140-, 000 scientists and engineers are now employed in research. A 1951 survey showed that about 600,000 Americans of working age have college degrees in science or engineering, Thus, more than one-fourth of the scientists and engineers are engaged in research.

INTERNATIONAL CONGRESS

Because of the rising cost of labor and the consequent increase in the use of automatic firing equipment, the proportion of bituminous coal that is mechanically cleaned in the United States is constantly increasing. By 1951, 42 per cent of the coal produced was thus treated, according to R. B. Engdahl and A. C. Richardson in their paper, "Preparation of Coal in the United States in Relation to Its Use." They also point out that mechanized mining, because it usually increases the amount of impurities, has increased the need for mechanical cleaning.

This invited paper was one of three prepared by Battelle scientists for presentation before the Fourth International Congress on Industrial Heating that met in Paris during the week of September 27. The Congress was composed of scientists largely from Western Europe.

In another paper, "Some Developments in Forming Refractory Metallic Coatings," Bruce Gonser reported that siliconized, chromized, and aluminum castings provide ferrous materials with good protection against oxidation at moderately high temperatures. Included in his paper are descriptions and evaluations of various coating processes.

A third paper on "High-Temperature Corrosion in Power Station Boiler Furnaces and Superheaters" was prepared by J. Harry Jackson.

HORMONE PREPARATION

The successful use of ultrasonics in the perparation of hormones has been reported. In laboratory experiments, recrystallized estrogen and progesterone, in aqueous suspension, have been subjected to high-frequency, high-energy sound waves at 250 kilocycles for 10 minutes.

Study under the microscope shows that, as compared with the untreated hormones, the treated samples have greatly reduced particle size, increased uniformity of particle size, and stabilization of the suspension.

According to Radcliffe Robinson, Battelle biologist, the use of ultrasonics for the disintegration and dispersion of hormones may greatly simplify their preparation. In the case of estrogen and progesterone, it may eliminate the laborious and expensive task of grinding them in a ball mill as well as the need for putting the hormones through a homogenizing process.

WAR AGAINST OAK WILT

Oak wilt is a fungus disease that threatens one of our most important sources of timber. It is attacking oak trees in many parts of the country. The disease, which is caused by a fungus growth closely related to that causing the Dutch elm disease, shuts off the trees' water supply. While the disease is fatal to all known kinds of oak, its attack on red oaks is most rapid. It will kill such trees in six months.

The first important step in attacking this, as other diseases, is to develop techniques for research. Dr. K. Starr Chester reports that Battelle has helped in the drive against oak wilt by developing research tech-

niques in its greenhouse laboratories. The research there is sponsored by the D. B. Frampton and Company and is aimed at finding chemical compounds that will identify and control the disease.

Year-round research may be assured by forcing red oak seedlings into leaf during the winter. This can be done by putting pressure on the buds of the seedlings.

Dr. Chester reports, "We have also developed an improved method of inoculation that is rapid and highly effective in infecting red oak seedlings with the oak-wilt fungus. The time for infection of the trees has been shortened from several weeks to as little as two days."

Dr. Chester reports unexpected success in growing oak seedlings under greenhouse conditions. He says, "One secret is to provide the trees with a second, helpful fungus that is always found in the roots of normal trees." It is his hope that these techniques will be helpful to fighters against the oak wilt all over the United States.

ATOMIC VS. WEIGHT PERCENTAGES

A new circular nomograph has been devised for the quick interconversion of atomic and weight percentages in binary systems. It can be used for determining the atomic composition of salts or the molecular concentrations in binary mixtures of any compounds of known molecular weight. In fact, it can be converted by calling the center scale specific gravity ratio instead of atomic weight ratio. The nomograph can be read to about one-tenth of a division, which gives atomic or weight percentages within 0.1 per cent in the vicinity of the centers of the scales.

This nomograph is the outgrowth of work originated by H. W. Russell and extended by R. W. Dayton and E. M. Simons, of Battelle. Copies may be obtained by writing the Battelle Publications Office.

INSTRUMENTS FOR RESEARCH

Research has expanded and diversified considerably in recent years. One of the factors that has aided and accompanied this growth is the increased use of instruments for measurement and control. The care and maintenance of the growing number of instruments sometimes has created a special problem for research organizations.

The problem was handled at Battelle by the establishment of a special Instrument Laboratory. The seventeen persons who staff the Laboratory have the responsibility of caring for and servicing about 3600 instruments.

The instruments serviced may be classed, in general, in two groups: those available on loan from the Instrument Laboratory and those assigned more or less permanently to a particular division or project. The instruments included in the loan group are those that are not required full time by any particular group or project. These include indicating and recording electrical meters, potentiometers, strain-gage indicators, temperature recorders and controllers, oscillographs, stop watches, timers, and dial gages. These total about 2000. From 80 to 90 per cent of these instruments are in use at any one time.

The second group of instruments, about 1600 in number, are in what might be called permanent locations. They are located and assigned because of continuous use or because they only fit the needs of a specialized laboratory. Analytical weights and balances are examples.

All of the instruments are included in a program of periodic calibration and maintenance. In spite of the rapid growth in the number of instruments, the Instrument Laboratory attempts to calibrate each one at intervals of about six months.

NEW LABORATORY BUILDING

A sixth large laboratory building is now under construction at Battelle's research center in Columbus. This newest building (another has just been occupied) will be of specially reinforced-concrete construction in order to minimize vibration. Plans call for the use of this building for electronics and other research requiring the use of delicate measurements.

Ground was broken for the "special purpose" laboratory building immediately after construction was authorized by the National Production Authority. The need for additional space is reflected in the expansion of the Institute's personnel. The staff has increased from 1384 to 1900 in the past year. With the completion of the new building, total laboratory area will be more than 15 acres of floor space.

RESEARCH FELLOWSHIPS

Two Ohio State University graduate students have been awarded research fellowships by Battelle. The recipients are Carl Schlea and David Stephan.

The fellowships cover a period of nine months of study and may be renewed. The Fellows have the privilege of conducting their thesis research in the Institute's laboratories. Under the arrangement, all the facilities of the research center are available to them. Through participation in seminars, round-table discussions, and other Institute activities, they gain an increased understanding of applied research. The fellowships are presented annually in order to encourage young technical students to continue graduate study.

RECENT PAPERS BY THE RESEARCH STAFF*

A Note on Woolridge's Theory of Secondary Emission. E. M. Baroody. *Physical Review*, June 15, 1952.

Calculation of Pore-Size Distribution From Gas Adsorption Data. J. C. Bell, Jack Belzer, and J. N. Pattison. *Engineering Experiment Station News*, Ohio State University, June 1952.

Behavior of Superheater Tubing Materials in Contact With Combustion Atmospheres at 1350°F. R. A. Blank, A. M. Hall, and J. H. Jackson. *Transactions of the American Society of Mechanical Engineers*, July, 1952.

Menace of Oak Wilt. K. Starr Chester. *Chemurgic Digest*, August, 1952.

Research in Private Institutions of the U.S.A. K. Starr Chester. *World Crops*, August, 1952.

Design of Flat-Wound Tension Springs. R. M. Conklin and D. R. Forry. *Transactions of the American Society of Mechanical Engineers*, July, 1952.

Keep Stoker Dust Emission Down. W. C. Holton and R. B. Engdahl. *Power Engineering*, July 1952.

Is Your Plant Contributing to Air Pollution? H. P. Munger. *National Safety News*, July, 1952.

Putting Ultrasonics to Work. Boyd Wise and Dale Ensminger. *Product Engineering*, August, 1952.

*In most cases, reprints will be available from the Battelle Publications Office upon request.

A Word About Battelle Technical Review Abstracts

The abstracts that appear in the following pages are prepared from approximately 900 American and foreign technical journals, as well as from books and other literature received in the Battelle Library. Prepared by a professional staff trained in various technological fields, the abstracts are selected for their usefulness to the Battelle research staff. They are now being made available to technologists and scientists in industry and research in all parts of the world, through the pages of the *Battelle Technical Review.*

BATTELLE TECHNICAL REVIEW ABSTRACTS

SECTION INDEX

AGRICULTURAL RESEARCH 693a
Plant and animal nutrition; insecticides; fungicides; fertilizers; weed control; soils; etc.

ANALYSIS—CHEMICAL AND PHYSICAL 657a
Methods and apparatus for qualitative and quantitative determination of the composition of matter.

APPARATUS, METHODS, AND STANDARDS 661a
Industrial measurement, inspection, and control; laboratory equipment and procedures (except when auxiliary to other subjects); standards and specifications.

CERAMICS 673a
Abrasives; inorganic cements; glasses; ceramic coatings; structural clay products; refractories; whitewares.

CHEMICAL TECHNOLOGY 678a
Chemical engineering and process equipment; chemistry of materials such as wood, paper, textiles, and coal and petroleum by-products; petroleum refining.

CHEMISTRY—GENERAL, INORGANIC, AND PHYSICAL 681a

CHEMISTRY—ORGANIC 686a

CLEANING, FINISHING, AND COATINGS—METALLIC 643a
Buffing and polishing; chemical and electrochemical cleaning and coatings; diffusion, dip, oxide, sprayed, weld-deposited, and vapor-deposited coatings; cladding.

CORROSION 654a
Theory, measurement, and prevention (except by means of coatings).

DESIGN 677a
Design of parts, equipment, and structures (except when auxiliary to other subjects); theoretical stress analysis.

ELECTRICITY AND ELECTRONICS 701a
Electrical and electronic theory, circuits, equipment, and applications (except when auxiliary to other subjects).

FOUNDRY PRACTICE 636a
Melting; casting; pouring; rigging; shakeout and trimming; molding; core and pattern making; metallurgical control.

FUEL TECHNOLOGY 669a
Solid, liquid, and gaseous fuels—their properties and combustion; carbonization, liquefaction, and gasification of solid fuels; synthetic fuels. (For combustion in engines, see Section 21.)

GRAPHIC ARTS 707a
Printing and decorating processes, equipment, and materials; book manufacture; photography.

HEATING, DRYING, AND AIR CONDITIONING 670a
Space heating; cooling; humidification; materials drying and heating; equipment such as ovens, boilers, furnaces, heat pumps, and auxiliaries.

LUBRICATION AND FRICTION 676a
Lubricants and lubricating methods; friction fundamentals; nonmetallic bearing materials; oil filtration; lubricating-system design.

METALLOGRAPHY AND PRIMARY STRUCTURES 645a
Microscopy, diffraction methods and other techniques; phase diagrams; nuclear and crystal structures; microstructures; macrostructures. (For structures resulting from transformation or deformation see Sections 11 and 13, respectively.)

METALS—FABRICATION AND USES 661a
Miscellaneous fabrication procedures; applications of metals, alloys, and specific processes.

SECTION INDEX (Continued)

METALS—MECHANICAL PROPERTIES AND TESTS 650a
Elasticity and plasticity; stresses and stress analysis; fracture; creep; shear; hardness; fatigue; wear resistance; deformation structures.

METALS—PHYSICAL PROPERTIES AND TESTS 649a
Mass, thermal, thermodynamic, chemical, electrical, magnetic, and optical properties.

METALS—PRIMARY WORKING 638a
Preparation for working; forging; rolling; extrusion; swaging; tube making; wire and rod drawing; slitting, sawing, shearing, etc.

METALS—SECONDARY WORKING 638a
Drawing; impact extrusion; forming; stamping; machining and machinability; grinding; honing and lapping; strain hardening; shot peening; flame cutting.

METALS—SMELTING, REDUCTION, AND REFINING 634a
Smelting and reduction of ores; distillation of metals; electrolytic winning and refining; thermit processes; cementation; amalgamation; carbonyl, halide, and hydride processes; ingot practice.

METALS—THERMAL TREATMENT 642a
Homogenization; annealing; normalizing; patenting; quench, precipitation, and case hardening; tempering; stress relief; cold treatment; heating and cooling media. (For effects of thermal treatment, see Sections 11, 12, and 13.)

METALS—TRANSFORMATIONS AND RESULTING STRUCTURE 647a
Diffusion; nucleation and grain growth; recovery and recrystallization; allotropic transformations; precipitation; eutectoid reactions; other solid-state reactions; liquid-phase reactions; solid-liquid, vapor-solid, and vapor-liquid reactions.

METALS—WELDING OR JOINING 640a
Welding; soldering; brazing; weldability and weld tests; bonding metals to nonmetals; adhesive bonding; mechanical fastening.

MISCELLANEOUS 708a
Research and research organizations; general metallurgical articles; mathematics; medical research; patent law; other unclassified subjects.

ORE AND MATERIAL BENEFICIATION 633a
Preparation and concentration of solid materials; roasting; calcining; sintering; nodulizing; briquetting; mineralogy.

PAINTS, VARNISHES, LACQUERS, AND ENAMELS 692a
Organic and inorganic coatings (except ceramic coatings); their composition, properties, application, and testing.

PHYSICS 696a
Theory and practice (except as covered in other sections). Includes aerodynamics; biophysics; flow of gases and liquids; deformation of solids; heat transfer; nucleonics; semiconductivity and superconductivity; ultrasonics; etc.

PLASTICS AND HIGH POLYMERS 688a
Polymerization; properties; testing; processing methods and equipment; compounding. (Does not include rubbers and surface-coating resins.)

POLLUTION AND WASTES 668a
Sampling, analysis, collection, prevention, and treatment of gaseous and liquid wastes, including smoke, fumes, odors, fly ash, dusts, aerosols, sewage, and industrial wastes; by-product recovery; meteorological, topographical, and biological effects.

POWDER METALLURGY 640a
Powder production and properties; mixing; compacting; sintering; post-sintering operations.

PRIME MOVERS 671a
Reciprocating engines; turbines; jet engines; rockets; locomotives; auxiliary equipment; power from atomic fission.

RUBBERS AND OTHER ELASTOMERS 691a
Polymerization; properties; testing; processing methods and equipment; compounding.

STATISTICS AND ECONOMICS 707a
Natural resources; supplies; production and cost data; articles on economic trends.

BATTELLE TECHNICAL REVIEW

Volume 1, Number 9

ABSTRACTS†

September 1952

1. ORE AND MATERIAL BENEFICIATION

11583* Sulphur Elimination; The Use of Sulphur as Fuel in the Sintering of Iron Ores. R. A. Elliot. *Canadian Mining Journal*, v. 73, July 1952, p. 51-56.

Reviews history, describes experimental apparatus and procedure, presents and discusses results. Tables and illustrations.

11584* The Rod Mill in the Sullivan Flow. H. R. Banks. *Canadian Mining and Metallurgical Bulletin*, v. 45, July 1952, p. 397-403; disc., p. 403; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 255-261; disc., p. 261.

Summarizes work of the rod mill through the first 5,000,000 tons and shows that the wear is definitely below normal. Consumption of steel, power, and other operating data. Observations on the principles involved in comminution. Material is galena. Photographs and tables.

11585 How Heavy-Media Preparation Broadens Belle Valley Market. Kenneth Wall. *Coal Age*, v. 57, Aug. 1952, p. 74-77.

Compact plant for 4 x 3/16 coal insures precision washing to expand market, provides high recovery, and uses a minimum of water. Includes flow diagram, tabular data, and illustrations.

11586* Tailings Disposal. *Colliery Guardian*, v. 185, July 17, 1952, p. 63-67.

Discusses the problem of disposal of wastes from froth-flotation plants for recovery of coal fines. Gives details of British pressure-filtration installations. Schematic diagrams and illustrations.

11587* The Relationship Between Polarization Colors and Rotation Properties of Anisotropic Minerals. L. H. Green. *Economic Geology and the Bulletin of the Society of Economic Geologists*, v. 47, June-July 1952, p. 451-458.

A basic explanation for the color of anisotropic minerals with crossed polarizer and analyzer is given and the possible application of these colors to mineral identification considered.

11588 Nchanga's New Copper Leach Plant. *Engineering and Mining Journal*, v. 153, Aug. 1952, p. 93. (From report by H. L. Talbot in *Optima*, a quarterly review published by Anglo American Corp.)

Includes flow diagram for above South African plant. Includes crushing, grinding, classification, leaching, thickening, ball milling, flotation, electrolysis, and casting.

11589 HMS Unit Improves and Increases Dolomite Production. *Engineering and Mining Journal*, v. 153, Aug. 1952, p. 97-99.

At Ntividad quarry of Kaiser Aluminium & Chemical Corp., near Salinas, Calif. Flow diagram and illustrations.

11590* Xanthates in Coal Flotation. R. M. Horsley, H. El-Sinbawy, and H. G. Smith. *Fuel*, v. 31, July 1952, p. 302-311.

Contact-angle experiments are described, demonstrating that pure alkali xanthates are not collectors for coal, but that the commercial products or pure xanthates in the presence of oxidizing agents have a collecting action. This is shown to be due to the formation of dixanthogen. 15 ref.

11591* Coal Crushing and Treatment Trends. W. H. Young and R. L. Anderson. *Mechanization*, v. 16, July 1952, p. 95-96.

Graphs and tables.

11592* Treatment of Copper Roaster Reverberatory Flue Dust. A. J. Kroha and J. A. Finley. *Mines Magazine*, v. 62, July 1952, p. 40-42, 58.

Describes experimental tests conducted in order to effect extraction of Cu and Pb from flue dust. A sulfatizing roast followed by an acid leach extracted the Cu but the Pb was unaffected. Chloridized roasting followed by acid-brine leach gave excellent extraction of both Cu and Pb. Flotation tests showed high reagent consumption for cement Cu and sulfide Cu and necessitated an additional circuit for recovery of oxidized Cu and Pb. Conclusions are summarized.

11593* Sampling and Screen Testing Fine Coal. T. W. Guy, F. S. Ferney, A. G. Gilbert, Geo. E. Keller, R. L. Llewellyn, and J. J. Merle. *Mining Congress Journal*, v. 38, July 1952, p. 29-32.

Outlines methods used for determining size consists of slurries in coal-cleaning plants.

11594 High-Efficiency Desliming By Use of Hydraulic Water Additions to the Liquid-Solid Cyclone. D. A. Dahlstrom. *Mining Engineering*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 788-793.

Shows feasibility of hydraulic water cyclones as fine-size classifiers. Desliming coefficients of 0.3 or less are obtainable and the operation can be done in one piece of equipment. Tables. 10 ref.

11595 Measurement and Evaluation of the Rate of Flotation as A Function of Particle Size. T. M. Morris. *Mining Engineering*, v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 794-798.

Experimental procedure included laboratory batch tests on cleaned concentrate Cu ore, Cu particles, and plant classifier overflow; and tests on samples from a 10-cell plant flotation machine floating pyrite. Discusses 2 different types of actions taking place. Tables and graphs.

11596* Heavy-Media Separation Used in Processing Refractory Materials. Walter B. Lenhart. *Rock Products*, v. 55, July 1952, p. 60-62.

Basic Refractories, Inc., uses sink-float process at Gabbs, Nev., operation for processing mine-run ore, as well as to recover material from low-grade rejects from older operations. Illustrated.

11597* Crushing Practice and Theory. Part VIII. Crushing Rolls and Their Use. Brownell McGrew. *Rock Products*, v. 55, July 1952, p. 65-68, 102.

Resumption of a series of articles begun in the June, 1950, issue of *Rock Products*. The last previous installment of the

†Prepared from books, journals, and other material received by the Battelle Memorial Institute Library.

1. *Ore and Material Beneficiation*

series was in June 1951. Discusses feed size and roll diameter, the capacity formula, peripheral speeds, reduction ratio, power requirements, character of product, and applications. (To be continued.)

11598* The Chlorination of Olivine Ore. H. H. Greenfield and R. W. Moulton. *Trend in Engineering at the University of Washington*, v. 4, July 1952, p. 22-24, 28.

Describes equipment, procedure, and results of experimental study of the above process—a step in the possible recovery of Mg from olivine.

Book

11599 Mineralogiia dlia Vsekh (Mineralogy for Everyone.) A. A. Iakovlev. 485 pages. 1947. Academy of Sciences of the USSR, Moscow and Leningrad. (QE365 Ia5m)

Written in a popular style for anyone interested in mineralogy, including scientists specializing in other fields. It deals with the formation of rocks, special minerals for ferrous and nonferrous metallurgy, rare and precious metals, minerals, and applications of minerals in industry. Drawings and tables. A bibliography and two indices, geographic and general.

See also:
12244 (preparation of coal)
12945 (benefication of Indian Mn)

2. METALS—SMELTING, REDUCTION, AND REFINING

11600 Ion Exchange Separation of Rhenium From Molybdenum. S. A. Fisher and V. W. Meloche. *Analytical Chemistry*, v. 24, July 1952, p. 1100-1106.

Describes method of Re recovery which is 99±3% complete. Ion exchange provides a means by which Re is not only separated from Mo but also concentrated and recovered in a form easily converted to a useful crystalline compound. The method is also readily adaptable to colorimetric determination. Graphs and tables. 14 ref.

11601 Charge Control for a Basic Open Hearth Furnace. V. H. Bridgewood and J. H. Kelly. *Blast Furnace and Steel Plant*, v. 40, August 1952, p. 903-912.

The dual influence of O_2 equivalent of the metallic charge and ore charged was investigated. It was found possible to represent O_2 equivalent of the charge by O_2 equivalent of the Si in the iron. Ratio of the O_2 equivalent of ore to O_2 equivalent of Si in both hot and cold iron was found to have a significant influence on production rate and carbon at lime up. A frequency distribution of the ore ratios in use was examined and an experimental ore ratio suggested. Influence of the limestone on basicity of slag at lime up was also investigated. A nomogram and a slide rule for simple and fast determination of weights of both ore and limestone were developed. Advantages of the suggested charge control are summarized. A spectrographic method of rapid determination of basicity is described.

11602 Melt Carbon and Related Open Hearth Problems. W. J. Frisbie, Jr. *Blast Furnace and Steel Plant*, v. 40, Aug. 1952, p. 928-932, 946.

Openhearth operators have long maintained that carbon content of the bath at melt has a direct bearing upon the time in which a heat is made and possibly upon the quality of the product; therefore, it was decided to attempt to devise a method by which "melt" carbon could be controlled within practical operating limits. Gives details of calculations plus tabular and graphical data. (To be continued.)

11603 The Manufacture of Sponge Iron in Sweden. *Chemical Age*, v. 67, July 5, 1952, p. 19-22.

Describes procedures and equipment.

11604* Calculated Energy Requirements of Electric Furnace Products. Gordon R. Finlay. *Chemistry in Canada*, v. 4, Feb. 1952, p. 25-28.

Minimum requirements of power are calculated for fusion of oxides and for synthesis of carbides. Previously published data on silicon carbide are revised and corrected. Energy required in kwh./lb. of product for fusion of Al_2O_3, MgO; and ZrO_2; for the purification of Al_2O_3 from bauxite and ZrO_2 from zircon sand; and for synthesis of TiC, ZrC, B_4C, SiC and ferrosilicon from the appropriate oxides is given. 17 ref.

11605* Utilization of Coke-Oven Tar for the Heating of Openhearth Furnaces. (French.) M. Hartemann. *Circulaire d'Informations Techniques*, v. 9, no. 7, 1952, p. 976-982.

Reports on experience with 4 openhearth furnaces, heated with tar since 1948. Describes operations, properties of this fuel, and compares results with those obtained with other fuels, particularly in the desulfurization of steels. Data are tabulated.

11606* The Direct Production of Tungsten Monocarbide, WC, From Tungsten Ore. (French.) André Chrétien, William Freundlich, and Francois-André Josien. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 30, 1952, p. 2608-2609.

Describes method in which a common tungsten ore known as wolfram is heated with carbon followed by treatment with hydrofluoric acid and aqua regia. This method is claimed to be very simple and rapid. Graphs.

11607* Applying Research to Steel Works Plant and Operation. R. F. Jennings. *Engineer*, v. 194, July 18, 1952, p. 83-84.

A general discussion.

11608 Is Pre-Openhearth Desulfurization Practical? C. E. A. Shanahan. *Iron Age*, v. 170, July 17, 1952, p. 136-137.

Discusses various desulfurization practices. British studies of refining treatments, both before and after the openhearth, indicate that Mn, P, and Si can be better removed in the mixer if there is increased agitation.

11609 Metals Melted Without Crucibles. E. K. Okress and D. N. Wroughton. *Iron Age*, v. 170, July 31, 1952, p. 83-86.

Development and description of Westinghouse's induction levitation method. Metals are heated, melted, and stirred with no support other than magnetic fields. Process shows promise for production of pure high-temperature metals, for alloying, and for sintering. Al, Al bronze, Ti, and Ag have been treated with varying success in air and in vacuum. Diagrams and photographs.

11610 The Effect of Sodium Oxide Additions to Steelmaking Slags. Part II. Dephosphorization of Steel by Soda-Slags. W. R. Maddocks and E. T. Turkdogan. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 128-136.

Further experimental melts were made at 1400 and 1550°C., and results are considered in relation to earlier data. The soda/silica and Fe/silica ratios are the main factors determining the extent of the removal of P from Fe. Slag-composition limits and relationship between slag composition and density are considered. Tables, graphs, and diagram.

11611 Addition of Boron to Steel by Reduction From Boron Oxide. G. E. Speight. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 147-153.

Above method was investigated as an alternative to commercial addition alloys in a series of laboratory experiments. It is shown that B can be introduced into steel from a borate so as to give improved mechanical properties. The means adopted and underlying chemical theory are described. Practical recommendations in various steelmaking practices are outlined. Data are given also on B pick-up in electric arc furnace practice; influence of Al additions on B transfer and its metallurgical effectiveness; and hardenability tests of Howlite-treated arc furnace casts. Tables and graphs.

11612 Sub-Surface Ingot Structure of Semi-Killed Steel. R. Wogin and A. Goodall. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 154-159.

A study to find the average sub-surface ingot structure produced by given amounts of ladle deoxidizer (silico-manganese) over the whole range of semikilled steels. Further experiments were made to find the quantitative effect of other variables on subsurface ingot structures, and a study was made of the defects associated with different types of semikilled ingot at one particular carbon level. Includes an extensive pictorial series in which structural variation at various carbon levels is traced and demonstrated. Graphs.

11613 Action of Inhibitors of Carbon Deposition in Iron Ore Reduction. S. Klemantaski. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 176-182.

Shows experimentally that, at 450°C., reduction and carbon deposition during the reaction of CO with Cumberland hematite ore can be controlled by the rate of gas flow and the addition of small concentrations of carbon-deposition inhibitors (C_2N_2, NH_3, H_2S, CS_2). On the basis of these and other experiments, carbon deposition and its inhibition are considered. A method of determining the extent of carbon deposition in operating blast-furnaces is suggested. Table, graphs, and apparatus diagram. 12 ref.

11614 Cooling of Rimming Steel Ingots in a Casting Pit. R. T. Fowler and L. H. W. Savage. *Journal of the Iron and Steel Institute*, v. 171, July 1952, p. 277-288.

Further observations were made on the temperature distribution at mid-height of an 8-ton slabbing ingot mold between teeming and stripping, using an improved technique to eliminate possible errors and obtain fuller data. Estimates were made of the rate of solidification of the mid-height slice of steel and of the temperatures at its surface and center.

11615* Measurement of the Viscosity of Synthetic Slags With a High Ferrous Oxide Content. Parts I and II. (French.) G. Urbain. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, May 1952, p. 308-322.

Proposes a new method for measurements on above slags, using optical pyrometry. Experimental results are discussed in detail. Data are tabulated and charted. 75 ref.

11616* A New Process for the Production of Aluminum: The Loewenstein Process. (French.) D. Ménégoz and P. Belon. *Journal du Four Électrique et des Industries Électrochimiques*, v. 61, May-June 1952, p. 79-82.

Describes new French electrolytic process which makes use of induction heating and vacuum volatilization. Discusses its chemistry. Diagrams and illustrations.

11617 Oxygen Refining of Pig Iron. *Metal Progress*, v. 62, July 1952, p. 156, 159-160. (Translated and condensed from "Refining of Phosphorus Cast Iron by Oxygen in the Openhearth Furnace", G. Husson and P. Bettembourg. *Revue de Métallurgie*, v. 48, Feb. 1951, p. 135-139.)

Previously abstracted from original.

11618 Steel "Quality"—What It Is and How to Get It. Harry W. McQuaid. *Metal Progress*, v. 62, Aug. 1952, p. 104-108, 164.

Discusses various factors involved in the above. They include avoidance of film-type sulfides, use of material low in S, addition of V for grain-size control, induction stirring, injection of finely dispersed basic compounds such as CaC_2, and use of directly reduced Fe as charge material. Pros and cons of each of these suggestions are discussed. Advantages of electric-furnace melting ore pointed out.

11619* El Paso Refinery of Phelps Dodge Refining Corporation. B. B. Kunkle. *Mines Magazine*, v. 62, July 1952, p. 25-29, 59.

Describes above electrolytic copper refinery, giving flow sheet and details of equipment and procedures, including casting of anodes, bars, and ingots.

11620* Cyanidation. Albert L. Pierce. *Mines Magazine*, v. 62, July 1952, p. 33-39.

Gives details of above process, used in production of gold and silver. In addition, many of the techniques and machines developed for the cyanide process have been adapted to the hydrometallurgy of other metals, chemical processes, sewage disposal, water handling, and even flotation. Includes chemistry as well as mechanical features of the process. Schematic diagrams.

11621* Horizontal or Vertical Retorts For Zinc Distillation? C. W. Jensen. *Mining Magazine*, v. 88, July 1952, p. 20-23.

Reviews the case for replacement of the old horizontal retort.

11622* New Method for Pyrometallurgical Recovery of Metals of the Rare-Earth Group. (French.) C. Decroly, J. Van Impe, and D. Tytgat. *Revue de Metallurgie*, v. 49, June 1952, p. 458-462.

Describes experimental technique for investigations of above type. Separation of oxides and reduction of fluorites of rare earths are described in detail. Data are tabulated. 10 ref.

11623* Research on the Deoxidation of Killed Open-Hearth Steel. Part Two. (French.) M. Nepper and H. Herbiet. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie*, ser. 9, v. 8, July 1952, p. 274-280.

Reports on investigations with 8 types of steel on the above. Results of investigation indicate that, by the openhearth process, steel can be produced with only 0.005% O_2, and of excellent macrostructure. Details of the process are indicated and extensively tabulated.

11624* Continuous Casting of Steel by the Junghans Process. (German.) Karl Georg Speith and Adolf Bungeroth. *Stahl und Eisen*, v. 72, July 17, 1952, p. 869-881; disc., p. 881-885.

Discusses basic advantages of continuous-casting process. Describes experiences to date and gives details of above process, and effects of various factors on it, as applied to round and square bars. Macrographs show structures obtained. Numerous graphs.

11625* Fundamental Researches on Smelting of Sulphide Ores. VIII. On the Equilibrium in the Reduction of Solid Stannous Sulphide by Hydrogen Gas. (English.) Kingo Sudo. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 187-193.

Above equilibrium was measured by a flow method and equilibrium constants determined between 533 and 679°C. Experimental results are summarized in empirical equations. Heat and standard free-energy changes for the formation of solid SnS from the elements at room temperature are calculated.

11626* Reduction Equilibria of Iron Oxides. III. Measurement of the Equilibrium of the Reaction. (English.) Koji Sanbongi. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 194-200.

Above was measured in the range 1530-1670°C. and an equation was obtained for the temperature function of the equilibrium constant. Dissociation pressure of molten FeO was calculated.

Miscellaneous Publications

11627 The Solidification of Steel in Continuous Casting. H. Krainer and B. Tarmann. Henry Brutcher, Translation 2649, 6 pages. (From *Stahl und Eisen*, v. 69, Nov. 10, 1949, p. 813-819.)

Previously abstracted from original.

11628 Conversion of Pig Iron Into Steel in the Converter With Use of Pure Oxygen. H. Hellbrugge. Henry Brutcher, Translation 2672, 10 pages. (From *Stahl und Eisen*, v. 70, Dec. 21, 1950, p. 1028-1211.)

Previously abstracted from original.

11629 Reduction of Metal Oxides by Solid Carbon. P. V. Gel'd, V. G. Vlasov, and N. N. Serebrennikov. Henry Brutcher, Translation 2778, 10 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 1, 1951, p. 693-696.)

Previously abstracted from original.

11630 Reduction of Titanium Dioxide With Calcium and Magnesium. A. Chretien and R. Wyss. Henry Brutcher, Translation 2857, 3 pages. (From *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 224, June 9, 1947, p. 1642-1643.)

Previously abstracted from original.

Books

11631 Metallurgiia Magniia (The Metallurgy of Magnesium.) Kh. L. Strelets, A. Iu. Taits, and B. S. Gulianitskii. 491 pages. 1950. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R. (TN779.M2 St83m)

Discusses characteristics of the raw material used for obtaining magnesium, theoretical bases of the extractive metallurgy of

2. *Metals—Smelting, Reduction, and Refining*

magnesium, and the technology of its production by electrolytic and thermal methods.

11632 Proizvodstvo Malouglerodistoi Stali. (Production of Low-Carbon Steel). D. P. Strugovshchikov. 216 pages. 1950. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Sverdlovsk and Moscow, U.S.S.R. (TN730 St89p)

Technology of the production of killed and unkilled low-carbon steels is described in detail. Properties of steel, its flaws, and measures taken to eliminate them during melting and casting are also discussed, along with theoretical bases of the technology of melting and casting of steel.

See also:
11592 (treatment of Cu-roaster flue dust)
11872 (thermodynamics of S compounds in steelmaking)
12192 (openhearth instrumentation and control)
12215 (openhearth dust control)
12219 (blast-furnace dust recovery)
12941 (low-grade ferrochromium for steelmaking)

3. FOUNDRY PRACTICE

11633 Better Control of Malleable Iron: New Tuyeres Improve Blast Penetration. Lewis Koch. *American Foundryman,* v. 22, Aug. 1952, p. 36-38.

Tells how a tuyere of novel design has helped improve duplex melting operations in a malleable foundry. Diagrams, graphs, and illustrations.

11634 How Aluminum Bonding is Keyed to Production. William M. Stocker, Jr. *American Machinist,* v. 96, July 21, 1952, p. 108-111.

The steel surface to be coated is machined and cleaned, then the steel is placed in molten aluminum to be "tinned"—which actually creates an Al-Fe alloy surface. After this, the part is placed in a mold and molten Al is poured around it. Tells how Continental Motors Corp. designed the process into its cylinder-head production line.

11635* Hydraulics Applied to Molten Aluminum. D. S. Richins and W. O. Wetmore. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 725-732.

Some of the more common fluid-dynamic properties of a molten Al alloy when flowing in sand ducts are reported. These were evaluated in the initial phase of an investigation to determine the effects of various configurations of casting flow systems upon casting quality. Graphs, photographs, tables. 10 ref.

11636* Relation Between Melting Conditions and Casting Defects in Iron Casting. Nobutaro Kayama. *Reports of the Casting Research Laboratory,* no. 3, 1952, p. 3-5.

Describes experimental procedure. Results tabulated, illustrated, and discussed. Effect of mechanism of oxidation and reduction is discussed.

11637* Studies of Gases Evolved on Solidification of Molten Cast Iron. Ichiro Iitaka and Minao Otsuka. *Reports of the Casting Research Laboratory,* no. 3, 1952, p. 15-16.

Experimental results on cupola iron and Swedish charcoal pig iron, with 7 different treatments. Graphs.

11638* Studies of Gases Evolved on Solidification of Molten Cast Iron. Minao Otsuka. *Reports of the Casting Research Laboratory,* no. 3, 1952, p. 26-30.

Experimental apparatus diagrammed. Data tabulated, charted, and discussed.

11639* Studies on Metal Penetration in Castings. Jiro Kashima. *Reports of the Casting Research Laboratory,* no. 3, 1952, p. 31-36.

Experiments were conducted on a series of Cu alloys with Zn, Sn, Al, and Sn+P; on effects of mold washes; and on oxidation rate of various types of Cu-alloy castings at elevated temperatures. Tables and graphs.

11640* Studies on Molding Sand Binders. Toshisada Makiguchi. *Reports of the Casting Research Laboratory,* no. 3, 1952, p. 37-42.

Influences of concentration of H ion in water added to inorganic binders, especially clay-type binders, were examined. Variation of binding strength was studied when acid, alkali, or strong electrolytes were mixed into water added to a kaolin or montmorillonite type binder. Variation of degree of sedimentation of the clay suspension was also studied, as well as the relationship between variation of binding strength and that of degree of sedimentation. Tables and graphs.

11641* Studies on Camlachie Cramp. Tsunemitsu Muraki. *Reports of the Casting Research Laboratory,* no. 3, 1952, p. 43-45.

Fusion between foundry chaplets and the metal being cast was studied. Soft-steel chaplets plated with Ag, brass, Cu, Ni, and Cr were used in a dry sand mold and gray iron cast around them. Microstructure of the interfaces between chaplet stems and the cast iron was studied. Use of powdered metals bonded with silicates or linseed oil was also studied. Results are charted, tabulated, and illustrated.

11642* On the Flow-Dynamic of Molten Metals. Kiyoshi Yokota. *Reports of the Casting Research Laboratory,* no. 3, 1952, p. 52-55.

Flow rates of molten Hg along paraffin channels (various degrees of smoothness) were studied, as an aid in study of optimum conditions for pouring of molten metals into molds. Diagrams and graphs.

11643* Cast Iron Research Laboratories. *Chemical Age,* v. 67, July 12, 1952, p. 53-55.

Brief listing of research investigations now being conducted at Bordesley Hall, Birmingham, England, which include nodular-graphite formation in the as-cast condition with special reference to interfering elements; effect of gases on properties of cast iron; direct reading methods for cast-iron analysis and determination of trace elements in cast iron; causes of enameling defects; properties of sand at high temperatures, and many others.

11644* Experimental Study on the Efficiency of Recirculation in Foundry Furnaces. (Concluded) Part III. Results. (French.) Georges Ulmer. *Fonderie,* June 1952, p. 2971-2982.

Describes tests with full-furnace charge. Heat input, output, and losses are indicated and related to the problem of recirculation. Tables and graphs.

11645* Study on Concretion, and Its Remedies. (French.) Pierre Nicolas. *Fonderie,* June 1952, p. 2983-2984.

Describes above foundry defect, also known as "galling". It is characterized by penetration of the metal underneath "tongues" of sand partially detached from the mold. Discusses causes and remedies.

11646 Selection, Testing and Use of Bonding Clays in Synthetic Molding Sand. W. W. Kerlin. *Foundry,* v. 80, Aug. 1952, p. 86-91, 223-224, 226.

Comprehensive discussion includes treatment of chemical analyses, fusion points, plasticity, clay material in foundry sand, and physical properties of various clays. Numerous graphs, diagrams, photographs, and tables.

11647 Gating for Shell Molding. Walter A. Sokolosky. *Foundry,* v. 80, Aug. 1952, p. 92-93.

Presents fundamentals of gating of castings to be made in shell molds. Shell molds are compared with green-sand molds and the difference noted. Diagrams.

11648 Refractory Permanent Molds. J. B. McIntyre. *Foundry,* v. 80, Aug. 1952, p. 102-103, 228, 232.

Describes briefly the development of molds from prehistoric times to the present. Discussion primarily concerned with present-day refractory mold materials and problems. Illustrated.

11649 Simple Correlation in the Foundry. W. K. Bock. *Foundry,* v. 80, Aug. 1952, p. 104-109.

Discusses fundamentals of correlation, its limitations and precautions to take in its application. Main applications are: (1)

permits use of simple tests to get information not otherwise available; (2) provides some measurement to improve foundry operations.

11650 Induction Furnace Melting of Corrosion-Resistant Alloys. B. Spindler. *Foundry*, v. 80, Aug. 1952, p. 110-113.

Discusses production melting equipment and foundry technique used in casting Ni-base alloys and high-alloy stainless steels. Production problems are considered. Photographs.

11651* Process Control of Cast Iron for Vitreous Enameling. J. Bernstein. *Foundry Trade Journal*, v. 92, June 5, 1952, p. 603-606; v. 93, July 10, 1952, p. 49-54.

Experience in the production of Fe castings for wet-process vitreous enamelling, the products being designed for domestic and industrial applications. Second installment includes cleaning and enamelling operations. Photomicrographs.

11652 Thermal Expansion and Contraction of Compacted Steel-Founding Sands and Mould Washes. D. V. Atterton. *Foundry Trade Journal*, v. 93, July 17, 1952, p. 61-68.

Length changes that occur during the heating and cooling of small, dried compacts of various molding materials were investigated. A theory is proposed to explain the variations observed. Castings defects caused by volume instability in the mold material are discussed in the light of the results, which suggest that differential expansion between the facing sand and underlying sand is the primary cause of scabs. 11 ref.

11653 Cupola Coke: With Particular Reference to High-Ash Coke. A. G. L. Lewis. *Foundry Trade Journal*, v. 93, July 24, 1952, p. 89-93.

Cupola coke in Southern Africa contains more than 0.15% ash, which is about double the ash content of cokes produced in the Northern Hemisphere. A similar position prevails in Australia and India. The ash content of American and European coke tends to rise. Attention is also drawn to a world-wide tendency —fluctuations in coke quality. The effect of high-ash coke and variations in coke quality on the production of iron castings from cupola melts and methods of dealing with these effects are discussed.

11654 Nitrogen Degassing & Metal Mould Reaction in the Production of Gunmetal Castings. E. C. Mantle. *Foundry Trade Journal*, v. 93, July 24, 1952, p. 95-98; disc., p. 99-100.

Gives details of laboratory and foundry experimental work on the above. Describes nitrogen-degassing technique. Diagrams and illustrations.

11655* Filling of the Dies in Pressure Casting. (German.) G. Lieby. *Giesserei*, v. 39, June 2, 1952, p. 311-315.

Mode of filling of above dies is discussed on the basis of hydrodynamic laws. Recommendations for choice of dies, position of casting, etc., are indicated. Schematic diagrams.

11656 Synthetic Casting Sand, Its Application and Usefulness in Gray Iron and Steel Casting. (German.) H. Gries and W. Trommer. *Giesserei*, v. 39, July 10, 1952, p. 333-341.

Discusses types of sand; control of composition, costs, characteristics of sands used; and results achieved with various types in the foundry. Diagrams, charts, and photographs. 28 ref.

11657* Monolithic Cupola Linings. Folke Sandford and Stig Fransson. *Gjuteriet*, v. 42, June 1952, p. 91-95.

Laboratory tests showed that the strain in the cupola shell when using a rammed silica-base cupola lining is not so large that there is any risk that a normally dimensioned cupola shell should break due to thermal expansion on heating or its growth on transformation of the silica to cristobalite. Tables and graphs.

11658* The Effect of Mold Material on Gas Content of Red Bronze Castings. (Swedish.) T. Malmberg. *Gjuteriet*, v. 42, June 1952, p. 96-103.

By density determinations on different parts of DTD test bars, cast of red bronze, it was established that moisture content of the molding sand may cause porosity. Different mold materials were investigated; clay-bonded sands both green and dry, sands bonded with special chemicals, and molds lined with sheet metal. A statistical survey was made of density of the feeder heads as well as the test bars as a function of pouring conditions. 10 ref.

11659* Nickel Conservation Research Announced by Alloy Casting Institute. Harold Schor. *Industrial Heating*, v. 19, July 1952, p. 1234, 1236.

Describes research done at Battelle on development of a heat-resistant material of lower alloy content than the high-Ni alloys frequently used in 900-1400°F. service. This work was incorporated into later studies which resulted in a method of Ni and Cr conservation in heat-resistant castings.

11660 Pressure Die-Casting of Aluminium. Part I. Design. Part II. Selection of Alloy. Part III. Holding Furnaces. Part IV. Die Casting Machines. Part V. Design of the Die. H. J. Sharp. *Metal Industry*, v. 81, July 4, 1952, p. 6-9; July 11, 1952, p. 27-28; July 25, 1952, p. 63-67; Aug. 1, 1952, p. 83-86.

Photographs, graphs, diagrams, and tables. (To be continued.)

11661 Beryllium Copper Cavities For Die Castings. *Precision Metal Molding*, v. 10, Aug. 1952, p. 32-34.

Cavities previously used only for plastic molding are now used successfully for high-quality Zn die castings. Physical properties of beryllium copper, service characteristics of the cavities, methods of forming them, normal tolerances that can be held, limitations on shape, and other information of value are discussed. They are produced by pouring around a master steel hob and immediately applying pressure.

11662 Techniques For Melting Aluminum. J. L. Stroman. *Precision Metal Molding*, v. 10, Aug. 1952, p. 41-42, 80-81.

Two-chamber melting furnace overcomes problems caused by adding cold metal to molten bath. Diagram and illustration.

11663* Magnesium Goes Automotive. *SAE Journal*, v. 60, July 1952, p. 47-53. (Excerpts from "New Applications and Developments of Magnesium Alloys in Automotive Industry," by J. D. Hanawalt and G. K. Glaza.)

A detailed progress report on the latest fabricating methods for Mg includes die casting, machining, electroplating, forming and drawing, impact extrusion, and joining. Also considers automotive applications. Illustrated.

11664* Investment Casting Method for Superalloy Parts Lowers Cost—Improves Design—Saves Material. Clarence E. Levoe. *Western Metals*, v. 10, July 1952, p. 44-47.

Describes system of investment casting used successfully on superalloy aircraft and guided-missile parts. Illustrated.

Miscellaneous Publication

11665 Influence of Nonmetallic Nuclei Upon the Graphite Structure of Cast Iron. Hereditary Phenomena in Cast Iron and Their Causes. O. Von Keil, R. Mitsche, A. Legat, and H. Trenkler. Henry Brutcher, Translation 24, 21 pages. (From *Archiv für das Eisenhüttenwesen*, v. 7, no. 10, 1933-34, p. 579-584.)

Laboratory and foundry studies of influence of iron-silicate particles of submicroscopic size upon the way cast iron solidifies. Prevention of silicate-slag clouding or elimination of it from the bath by preliminary deoxidation with Al; reduction with Ca or Mg; or transfer of iron silicate to slag. Influence of oxidation of bath; superheating; addition of scrap; after-treatment with Si; and slag control. Relationship between content of Fe-Si particles and heredity of graphite structure in pig iron and cast iron. 19 ref.

Book

11666 Sviaziushchie Materialy dlia Sterzhnei. (Binding Materials for Cores) I. B. Kumanin and A. M. Liass. 272 pages, 1949. Government Publishing House for the Defense Industries, Moscow, U.S.S.R. (TS236 K96s)

Presents theoretical bases of the action of core binders and practical information on their application in foundries and casting departments. Properties and special features of individual binders used in the U.S.S.R. are discussed in detail. Methods of testing binders are described at length.

See also:

11609 (melting metals without crucibles)
11632 (steel foundry practice—Russian book)
11874 (melting of Cd)
11896 (properties of Zn-base die-casting alloy)
12195 (melting and casting of Zr and Be)

4. METALS—PRIMARY WORKING

11667 How Draw Speed Affects Stainless Wire. Samuel Storchheim. *American Machinist*, v. 96, July 21, 1952, p. 124-125.

Effects of draw speed on coercive force, remanence, ultimate tensile strength, and electrical resistivity of Types 302 and 304 stainless-steel wires were determined. Tables and graphs.

11668 Wide Strip Mills—Evolution or Revolution? Frank H. Fanning. *Blast Furnace and Steel Plant*, v. 40, Aug. 1952, p. 913-920.

Reviews history of development of the above. Shows effects on productive capacity and other economic gains. Illustrations show results of cupping tests and microstructure of annealed sheets produced in different ways, also automobile-body parts made from them. (To be continued.)

11669* The Deformation Through the Die by Drawing of a Rod. Hiroshi Yamanouchi and Ikuhiko Hayashi. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 61.

Research on 4 steel test pieces through a steel die having different die angles with 3 components of linear natural strain and additional shear strain. Shear-stress diagrams.

11670 Novel Press Setups Produce Cold-Drawn, Hot-Forged Parts. A. B. Mooers. *Iron Age*, v. 170, Aug. 14, 1952, p. 130-133.

Unusual set-up used by Buick Motors Div. to turn out a rear-axle housing flange. SAE 1008-1020 hot-drawn plate blanks are tumble blasted before drawing. All cold operations except blanking are done in 4 dies mounted in one Toledo 96-B press. A Surface Combustion rotary furnace heats the partly formed parts in a scale-inhibiting atmosphere. Hot-working is completed in a 1300-ton Ajax forging press. A 6-man team turns out 365 parts per hr.

11671* The Manufacture of Reinforced Steel Tubing. E. Hormann. *Engineers' Digest*, v. 13, July 1952, p. 225-226. (Translated and condensed from *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Apr. 21, 1952, p. 343-345.)

Illustrated description of above. Steel tubes may be reinforced or flanged by upsetting under heat. Local induction heating is recommended. Also describes manufacture of internal reinforcements. Tensile strength of 24-ton steel at elevated temperatures is given. Photographs.

11672 Discussion on the Paper—Cooling Beds for Bar Mills. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 183-189.

A discussion, with author participation, of the above paper (Nov. 1951 issue). Graph.

11673 Cold Rolling With Strip Tension. Part II. Comparison of Calculated and Experimental Results. H. Ford, F. Ellis, and M. I. Mech. **Part III. An Approximate Treatment of the Elastic Compression of the Strip in Cold Rolling.** D. R. Bland and H. Ford. *Journal of the Iron and Steel Institute*, v. 171, July 1952, p. 239-249.

In Part II the approximate method of calculating roll force and roll torque is compared with the experimental results of Hessenberg and Sims. In Part III, approximate equations are derived for the contributions to the roll force and torque from those parts of the roll gap in which the strip is only elastically compressed. Tables and graphs. 12 ref.

11674* New Results of Rolling Research and Their Application to Rolling Practice in Hot and Cold Rolling of Metals, Particularly Aluminum-Base Light Alloys. O. Emicke. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 18, June 1952, p. 189-206.

Reports on large-scale experiments on the cold rolling of copper, brass, aluminum, and duralumin, and on deep drawing stripsteel, for the purpose of finding reliable and simple bases for calculation of rolling processes. Data are extensively charted. 13 ref.

11675 An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. IV. Theory and Practice of Tension and Gauge Control in Modern Production Mills. N. H. Polakowski. *Sheet Metal Industries*, v. 29, Aug. 1952, p. 709-715.

Includes schematic and circuit diagrams. 23 ref.

11676* Productivity Increase in the Drawing of Bars Using Infinitely Variable Speed Control. (German.) Fritz Boehm. *Stahl und Eisen*, v. 72, July 3, 1952, p. 797-804.

Presents results of a comprehensive experimental and theoretical investigation of the above. Includes graphs.

Miscellaneous Publications

11677 Effect of Steel Composition Upon Sticking of Sheet in Rolling. V. Magidson. Henry Brutcher, Translation 2444, 5 pages. (From *Stal*, v. 3, nos. 5-6, 1943, p. 67.)

Report on experiments conducted to minimize the sticking of steel sheets. Difficulties encountered with low-carbon sheets containing less than 0.10% C. Effect of 0.06-0.12% P upon percentage of stickers. Recommended upper limit for minimum sticking.

11678 Width Gage for Hot Strip Rolling Mills. E. S. Sampson. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 341-351. (TK161 N21p)

Described, diagrammed, and illustrated.

Books

11679 The Seamless Story. J. Perc Boore. 285 pages. 1951. Commonwealth Press, Los Angeles. (HD9529.T82 B64s)

History of the seamless steel tube industry in the U. S.—including invention, development of the product and contemporary mills, and pertinent biographies. Gives technical bibliography compiled by Victor S. Polansky.

11680 Forging and Forming Metals. S. E. Rusinoff. 279 pages. 1952. American Technical Society, Chicago. (TS225 R89f)

Impact forging, press forging, upset forging, extrusion, heat-treatment of forgings, cleaning and finishing forgings, inspection, safety, metal quality, and the design of forgings and tools and dies are thoroughly covered. Explanations are supplemented by photographs and drawings. In many cases the entire sequence is illustrated from the first operation to the finished forging.

See also:
12195 (fabrication of Zr and Be)

5. METALS—SECONDARY WORKING

11681 Alloyed-Titanium Tooling. *Aero Digest*, v. 65, Aug. 1952, p. 17-19.

Presents candid discussion of headaches involved in fabrication of Ti alloys for production dies. Discusses problems encountered in connection with drilling, stamping, and forming Ti alloys.

11682 How to Bend High-Strength Extruded Shapes. F. C. Hoffman. *American Machinist*, v. 96, July 21, 1952, p. 115-122.

New method developed at Lockheed Aircraft Corp. Jobs that formerly required 30 min. now can be done in 3. Accuracy within 5 min. of arc can be held consistently. Bending is performed in a specially designed fixture mounted in a standard hydraulic press. Numerous diagrams and illustrations.

11683 How to Machine and Finish Stainless Steel. *American Machinist*, v. 96, Aug. 4, 1952, p. 111-126.

Contains one section on basic rules governing tooling, machine operation, and cutting fluids, and a 2nd section on specific operating tips for major metal-cutting operations. The 3rd major section summarizes latest ideas on finishing methods, including grinding, buffing, and polishing. Numerous tables, graphs, schematic drawings, and photographs.

11684* Tool Forces and Tool-Chip Adhesion in the Machining of Nodular Cast Iron. K. J. Trigger, L. B. Zylstra, and B. T. Chao. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 1017-1025; disc., p. 1025-1027.

Presents results of an investigation of the machining characteristics of nodular cast iron in both the as-cast and the annealed conditions. Tool forces, cutting temperatures, and tool-chip con-

tact areas are compared for different grades of cemented-carbide tools. Tables, graphs, and photomicrographs. 16 ref.

11685* A Comparison of Parameters for the Machining of Gray Cast Iron. L. V. Colwell, H. J. Holmes, and F. B. Rote. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 1029-1037; disc., p. 1037-1038.

Compares several types of data on parameters for predicting cutting speeds of gray iron. A series of 11 irons, representing ranges of alloys, ferrite, graphite, and mechanical properties was used in the study. Cutting forces, power, and energy were determined from drilling and milling tests, and cutting speed-tool life lines were determined for each of the irons. Correlations were attempted between cutting speed for a 20-min. tool life, and other available information. Numerous tables, graphs, and photomicrographs.

11686* Thermophysical Aspects of Metal Cutting. B. T. Chao, K. J. Trigger, and L. B. Zylstra. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 1039-1049; disc., p. 1049-1054.

Some basic issues in the theory of metal cutting are analyzed. Describes the effect of cutting speed and feed on the mechanism of chip formation in high-speed machining operations. A differential equation of the temperature field in the chip as well as that in the workpiece was set up, and the nature of the solution studied. The thermal number and its significance in metal cutting is illustrated and its limitations discussed. Graphs. 15 ref.

11687* The Mechanics of Three-Dimensional Cutting Operations. M. C. Shaw, N. H. Cook, and P. A. Smith. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 1055-1064.

Chip-flow direction and the velocity and force relations for an oblique cutting tool are compared with experimental results. The analytical consequences of the observations are discussed. Method of applying the oblique-tool results to 3 dimensional tools is illustrated by 3 examples involving lathe tool, a face-milling cutter, and a drill point. The latter discussion is elaborated upon. Diagrams, tables, and graphs.

11688* Measuring the Cooling Properties of Cutting Fluids. G. M. Hain. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 1077-1079; disc., p. 1079-1082.

Describes a simple technique for evaluating the heat transfer properties of fluids. Graphs.

11689* Oxygen-Cutting of Cast Iron, Stainless Steel, and Other Cast Alloys. (Spanish.) I. Aversten and Chr. Scharfhausen. *Ciencia y Técnica de la Soldadura*, v. 1, July-Aug. 1951, 9 pages.

Difficulties encountered in oxygen cutting and the conditions under which it can be used for different materials are discussd. Compares changes in material subjected to ordinary oxygen-cutting and to oxygen-cutting with pulverized iron. Drawings and photographs.

11690* Oxygen Cutting With Powder. (Spanish.) André Brizard. *Ciencia y Técnica de la Soldadura*, v. 1, Sept.-Oct. 1951, 8 pages.

Discusses 3 oxygen-cutting processes with powder: iron powder, chemical powder, and inert powder. Each is studied separately, describing materials needed and possible applications. Includes schematic drawings and tables.

11691* "Machining" Hard Metals by Electric Spark. *Engineering*, v. 174, July 25, 1952, p. 121-122.

Equipment developed by British firm. Schematic diagrams and illustrations.

11692 Machinability of Gray Iron by Constant Pressure Lathe Tests. Edward A. Loria. *Foundry*, v. 80, Aug. 1952, p. 194, 196, 198, 200.

Presents quantitative data on the machinability of various gray cast irons measured on the constant pressure lathe developed by Battelle Memorial Institute.

11693 Titanium Sheetmetal Parts Successfully Made. Andrew N. Eshman. *Iron Age*, v. 170, July 17, 1952, p. 132-135.

Describes fabrication processes for Ti webs, channels, frames, shrouds, and angles at North American Aviation, Inc., Columbus, Ohio. Forming and drilling are emphasized. Photographs.

11694 Carbon Dioxide Coolant Lowers Tool Grinding Costs. John Kwolek. *Iron Age*, v. 170, Aug. 14, 1952, p. 124-125.

Extensive tests at Cadillac's Tank Plant show many advantages from use of CO_2 as a coolant in grinding carbide tools. Grinding can be done faster. Wheel life is longer. Life of tools ground is longer. Grinding is cleaner. There are no disposal, sanitation, or fire hazard problems. Surface finish is better. Materials handling is simplified. However, cost is relatively high.

11695 Central System Distributes CO_2 Coolant for Grinding. P. S. Cerne and C. O. Parrat. *Iron Age*, v. 170, Aug. 14, 1952, p. 126-128.

Extensive tests have sold Thompson Products, Inc., on use of CO_2 as a coolant in grinding carbide tools, carbide and high speed-steel broaches. Experiments on other machining uses are being made. Thompson has installed a central storage tank from which a high-pressure pump feeds CO_2 through pipelines to points of use.

11696 What You Should Know About Stretch Forming. E. V. Sharpnack. *Iron Age*, v. 170, Aug. 14, 1952, p. 138-140.

Discusses advantages and disadvantages for production of Al parts. Gives recommendations for procedures and for selection of alloys.

11697 Some Recent Concepts of Machinability. *Lubrication*, v. 38, July 1952, p. 81-96.

Discusses fundamental processes involved in chip formation, tool life, role of cutting fluids in machining of metals, microstructure and machinability, application to cast iron, steels, high-temperature corrosion-resistant alloys, and titanium. Tables, graphs, diagrams, and micrographs.

11698* Unusual Manufacturing Methods Developed by Lockheed. *Machinery* (American), v. 58, July 1952, p. 164-171.

Describes and illustrates following methods used at Lockheed Aircraft Corp., Burbank, Calif.: "peen-forming"—shot peening to put the curves into integrally-stiffened Al wing panel members; fabrication of integrally stiffened panels from tubular extrusions; and plastic tooling in forming operations.

11699* The Influence of Higher Rake Angles on Performance in Milling. Joe H. Crawford and M. Eugene Merchant. *Machinery* (London), v. 81, July 10, 1952, p. 47-55.

A range of rake angles and cutting speeds was selected, and studies were made on cutter life and surface finish as a function of these variables. Effect of these variables on such quantities as forces, shear angle, chip friction, work done in cutting, and calculated temperature of the chip-tool interface were also investigated. High-speed-steel cutters and hot-rolled SAE-1020 stock were used. Photographs, graphs, and table.

11700* Electric Spark "Machining". *Machinery* (London), v. 81, July 10, 1952, p. 57-61.

Describes equipment for above manufactured by Sparcatron, Ltd., Gloucester, Eng., for piercing and "grinding" operations. Examples of use are discussed. Block and circuit diagrams and photographs.

11701* Drilling Machines. Part 3. *Machine and Tool Blue Book*, v. 48, Aug. 1952, p. 243-244, 246, 248, 250, 252, 254.

Drilling stainless steels, Meehanite, graphitic steels, nitriding steels, hard materials, and armor plate.

11702* Cold Forming Stainless Steel Parts. Kenneth Rose. *Materials & Methods*, v. 36, July 1952, p. 101-116.

A detailed study of various stainless steels, their formability properties, grades and applications for specific operations. Major points of discussion are selection factors, cold-forming properties and methods, tool and die materials, cleaning and finishing, and annealing procedures. Profusely illustrated.

11703 Cold Working Copper-Base Alloys. H. M. Miekk. *Metal Industry*, v. 81, July 4, 1952, p. 10-13.

Discusses the influence of the crystal structure of alpha brass on its cold-working properties, stressing uniformity and average

5. *Metals—Secondary Working*

grain size. Also recommends that additions of phosphorus to α-brass be avoided in the manufacture of brass sheet for deep drawing.

11704 Electro-Machining of Carbides and Other Hard Compacts. Arthur H. Allen. *Metal Progress*, v. 62, Aug. 1952, p. 87-89, 142.

Discusses use of above process to reduce consumption of diamond bort. Considers the electrolytic process, the electro-sparking process, the ultrasonic process, and combination processes.

11705 A Comparison of Twist Drills Manufactured From Standard and Special High-Speed Steels; Effect of Various Methods of Flute Preparation. P. Spear, I. R. Robinson, and K. J. B. Wolfe. *Metal Treatment and Drop Forging*, v. 19, July 1952, p. 293-301.

Twist drills of ⅜ in. diam. manufactured from the standard 18-4-1 high-speed steel were compared with those of the same diameter made from 3 high-speed steels of lower tungsten content. Results of investigation are charted, tabulated, and discussed. Data were subjected to statistical examination. Includes X-ray diffraction patterns and micrographs. 10 ref.

11706* Friction Sawing at Solar Aircraft. Gilbert C. Close. *Modern Machine Shop*, v. 25, Aug. 1952, p. 136-140.

Experiments with toothless band saw blades point way to fast, economical method of cutting ferrous metals. Illustrated.

11707 Hi-Jet System for Increasing Tool Life. R. J. S. Pigott and A. T. Colwell. *SAE Quarterly Transactions*, v. 6, July 1952, p. 547-566.

Reviews the improvements resulting from applying cutting liquids in fine forced jets. Compares results with those obtained by the flooding system. Also describes the adaptations of various recording instruments and other improvements developed during running of the tests. Many practical applications of the Hi-Jet system are considered. Illustrated.

11708 Springback: Problem in Metal Forming. Frederico Strasser. *Steel*, v. 131, Aug. 4, 1952, p. 90-91.

Springback is the property of any piece of metal which is bent or formed, either by hand, or by mechanical means not to maintain completely the shape given to it by the tool, but to recover somewhat its original shape, or position, after the bending stress is released. Discusses factors involved and methods for minimizing springback. Diagrams.

11709 Machinability: Theory Pays Off. R. K. Gould. *Steel*, v. 131, Aug. 18, 1952, p. 98-102.

Presents elementary review of above theory. Shows that basic principles and underlying laws governing the cutting and machining of metals are gradually being put to work to solve tough machining problems.

11710 Metal Cutting Temperatures and Tool Wear. Part II. (Concluded.) A. O. Schmidt. *Tool Engineer*, v. 29, Aug. 1952, p. 51-54.

Discusses cratering effect observed at high cutting speeds caused by higher tool temperatures. Illustrates effects noted in carbide milling of SAE 1020, 1055, 3140, 4150, 4335, and NE-8745 steel. 11 ref.

Miscellaneous Publications

11711 Profiling and Relieving of Milling Cutters by the Anodic-Mechanical Process. G. S. Belyaev. Henry Brutcher, Translation 2825, 5 pages. From *Stanki i Instrument*, v. 20, Dec. 1949, p. 11-12.

Previously abstracted from original.

See also:
11663 (machining, forming, drawing, and impact extrusion of Mg)
11670 (presswork on rear-axle housing flange)
11680 (forming of metals—book)
12195 (fabrication of Zr and Be)
12334 (fiberglass tooling in aircraft production)

6. POWDER METALLURGY

11712* Acceleration of Single-Phase Sintering. Discussion of the Mechanism of Action of Mineral Additions. (French.) Serge Tacvorian. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 9, 1952, p. 2363-2365.

Discusses the above as applied to refractory powders of different types: W, Th, graphite, Al_2O_3, MgO, ThO_2, carbides, etc. Shows effects of a small quantity of liquid phase, generally in equilibrium with the solid phase at the temperature considered.

11713* Practical Applications of Hot Pressing. Jerome F. Kuzmick. *Materials & Methods*, v. 36, July 1952, p. 84-87.

Discusses applications of hot molding to production of tungsten carbide dies and shaped pieces, heavy metal products, and high-temperature alloys from metal powders. Illustrated.

11714 Porous Stainless Steel: A New Filter Material. *Metallurgia*, v. 46, July 1952, p. 38.

Describes production, properties, and applications of British product.

11715* Impregnated Iron-Copper Materials. (German.) A. Vidmajer. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 3, 1952, p. 664-677.

Above are shown to be intermediate in properties between alloys and mixtures with properties usually different from and superior to those of its components. Preparation of porous Fe compacts and their impregnation with Cu is described. Rupture strength, hardness, and electrical properties of compacts, porous sintered bodies, and impregnated bodies are compared.

11716 Extinction Effects in Powders. R. J. Weiss. *Proceedings of the Physical Society*, v. 65, sec. B, July 1, 1952, p. 553-555.

Brief mathematical discussion of the above effects, in an attempt to explain intensity differences for cold-worked and annealed metal-powder samples.

11717 Technology of Pre-Alloyed Stainless Steel Powders—Properties, Production, Uses. Part 2. Arthur H. Grobe and George A. Roberts. *Precision Metal Molding*, v. 10, Aug. 1952, p. 36-38, 74-75.

Summarizes results of extensive mechanical testing of sintered bars made from 5 types of stainless-steel powder. Shows relationships to compacting and coining pressures and to sintering and resintering temperatures.

11718* Proposes Methods for Testing Metal Powders. (German.) Rolf Schwalbe. *Stahl und Eisen*, v. 72, July 17, 1952, p. 898-903; disc., p. 903-904.

Methods for sampling and for determination of chemical composition, shape and size of grains, grain-size distribution, and powder-metallurgy characteristics (pouring and compression). Compilation of test values for several iron powders.

Miscellaneous Publications

11719 Investigation of the Specific Surface of Metal Powders. I. M. Fedorchenko. Henry Brutcher, Translation 2766, 14 pages. (From *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Mar. 1951, p. 411-418.)

Previously abstracted from original.

See also:
11609 (sintering metals in free space)
11768 (electrolytic Ti powder)
11886 (fabrication of Mn-Bi magnets)
12138 (powder metallurgy as research tool)
12195 (powder metallurgy of Zr and Be)
12878 (sintered-Ni battery plates)

7. METALS—WELDING OR JOINING

11720* Gases and Nonmetallic Inclusions in Electric-Arc Welding. (Spanish.) Jose Maria Sistiaga. *Ciencia y Técnica de la Soldadura*, v. 2, Jan.-Feb. 1952, 6 pages.

Studies the presence of porosity, the formation of nitrides and the nature and origin of some nonmetallic inclusions of steels in welding by means of a thin iron-oxide-base electrode coating. Discusses influence of these factors on mechanical properties of the weld metal. Includes photomicrographs.

11721* Completely Welded Ship Hulls. Practical Consequences of the Results Obtained During Their Construction and Maintenance. (Spanish.) Erich Volbrecht. *Ciencia y Técnica de la Soldadura,* v. 2, Jan.-Feb. 1952, 10 pages.

Describes construction of a series of torpedo-boat hulls, discussing in detail various problems involved. Includes schematic diagrams.

11722* Present Status of Welded Construction With Light Metals. (Spanish.) A. Matting. *Ciencia y Técnica de la Soldadura,* v. 1, July-Aug., 1951, 11 pages.

Methods of welding Al and light alloys of different types by various processes, including results obtained in corrosion and tensile-strength tests, are discussed. Includes photomicrographs.

11723* New Possibilities of Macro- and Microphotography in Welding Investigation. (Spanish.) Felipe A. Calvo Calvo. *Ciencia y Técnica de la Soldadura,* v. 1, Nov.-Dec. 1951, 6 pages.

Discusses the above with respect to photographs obtained by oblique illumination and reflected illumination. Illustrated.

11724* Complementary Materials in the Welding of Steel. (Spanish.) A. Matting. *Ciencia y Técnica de la Soldadura,* v. 1, Nov.-Dec. 1951, 10 pages.

Discusses composition and characteristics of the most important complementary welding materials, their behavior during melting, special electrodes used in arc welding, and cracking. Includes photomicrographs.

11725 Ferritic Welding Electrodes Save Alloy, Give Better Welds. Z. J. Fabrykowski. *Iron Age,* v. 170, July 24, 1952, p. 93-97.

Savings in strategic alloys of about 85% were obtained by using ferritic instead of austenitic rods by Army Ordnance. The practice is being used on U. S. military vehicles for steel-plate thicknesses up to ¾ in. where ballistic tests must be met. Mechanical properties of welds are tabulated. All major alloying elements are in the coating.

11726 Selecting the Correct Welding Process. John J. Chyle. *Machine Design,* v. 24, Aug. 1952, p. 182-185, 265-266, 268.

Presents systematic analysis of methods for the above, classified under the 7 most important factors involved. Each of the latter is discussed at length. Tables show recommended welding processes for different materials and for different joint designs. Graph shows comparative costs.

11727 Pressure Welding. R. F. Tylecote. *Metal Industry,* v. 81, July 18, 1952, p. 43-46; July 25, 1952, p. 72-73.

Deals with theory and practice of joint metals by pressure by solid-phase welding, that is at temperatures where there is no liquid slag or low-melting point metallic constituents present to assist welding. Tables, graphs, and micrographs. 15 ref.

11728 German Report on Welding in the U. S. *Metal Progress,* v. 62, Aug. 1952, p. 146, 148, 150, 152, 154. (Condensed from "Welding Technology in the U. S. A.", H. Von Hofe, E. Kauhausen, H. Koch, K. L. Zeyen, and E. Zorn, *Schweissen und Schneiden,* v. 3, Dec. 1951, p. 359-370.)

Observations made by the German members of Tour Group 5 (Welding and Joining) during their visitations to American plants as part of the world program of the first World Metallurgical Congress are reported.

11729 Resistance Welding Applications Increase. *Steel,* v. 131, July 21, 1952, p. 91-96, 98.

A special report to show wide possibilities of resistance welding as a means of cutting fabrication costs. Discusses the process in general and its 6 types; welding controls; power supply; and electrodes. Lists metals that can be resistance-welded and numerous applications. Photographs.

11730 High Chromium Stainless As a Substitute for 18-8. Part II. Welding, Brazing, Polishing. Lester F. Spencer. *Steel Processing,* v. 38, July 1952, p. 340-343, 350.

Discusses the above in some detail. Tables and photomicrographs. 11 ref.

11731 Steel Welded by Inert-Arc Metal-Arc. *Welding Engineer,* v. 38, Aug. 1952, p. 23, 64.

Solar Aircraft Co., San Diego, Calif., has developed new techniques and applications for the above process. A consumable electrode in the form of a wire of the required diameter is fed automatically to the gas-shielded arc. Advantages are discussed. Illustrated.

11732 What Per Cent of Your Welding Electrodes Do You Use? Ted. Jefferson. *Welding Engineer,* v. 38, Aug. 1952, p. 51.

Presents a graph of the above based on results obtained from 3/16-in. heavily coated electrodes 14 in. in length.

11733* Slope Taper Control in Spot Welding 24ST Aluminum. I. W. Johnson. *Welding Journal,* v. 31, July 1952, p. 549-551.

Shows that addition of taper control to the standard slope control greatly simplifies spot welding of material such as 24S-T Al.

11734* Military Aeronautical Spot- and Seam-Welding Specifications. J. Maltz and N. E. Promisel. *Welding Journal,* v. 31, July 1952, p. 561-566.

Development of above specifications is traced.

11735 Process Control for Resistance Welding Under Government Specifications. Frank G. Harkins. *Welding Journal,* v. 31, July 1952, p. 567-574.

Describes a realistic approach to conformance with MIL specifications 6858 and 6860 which deal with resistance welding of ferrous materials, Ni and Co base alloys, and light metals. Data from 15 machines involving 3280 tension-shear tests and 570 macro-etch specimens on 10 gages of material are presented. A relationship between nugget diameter and tension-shear value has been established. A tentative statistical-control procedure which will not permit production of substandard welding is described.

11736* Inert-Gas-Shielded Arc Consumable Electrode Welding. E. E. Rockefeller. *Welding Journal,* v. 31, July 1952, p. 575-586.

Describes the sigma welding process including equipment, gases, electrodes, current, and some interesting applications. Specifically covers Al, Cu, carbon and stainless steels. Numerous diagrams, tables, graphs, and illustrations.

11737* Problems and Equipment in Aircraft Spot Welding. J. R. Fullerton. *Welding Journal,* v. 31, July 1952, p. 586-591.

Equipment used by Ryan Aeronautical Co. for resistance-welding applications together with an indication of the advantages and limitations of each type. Illustrated.

11738* Stainless-Steel Applied Liners. Helmut Thielsch. *Welding Journal,* v. 31, July 1952, p. 321s-337s.

Review of published and unpublished information on welding procedures used in the fabrication of applied liners; heat treatments, testing procedures, and code requirements. 68 ref.

11739* Design Properties of Brazed Joints for High-Temperature Applications. Robert L. Peaslee and Willard M. Boam. *Welding Journal,* v. 31, Aug. 1952, p. 651-662.

Tells how, with a reducing atmosphere and Ni-Cr-base alloy, using suitable procedures and equipment, the brazing of stainless steel for high-temperature work can be successfully accomplished.

11740* 1951 Adams Lecture: The Welding of Copper by the Inert-Gas Metal-Arc Process. John J. Chyle. *Welding Journal,* v. 31, Aug. 1952, p. 663-686.

Begins with history of discovery of Cu, outlines smelting and refining practice, mechanical properties, and other welding processes, before going on to describe above process in detail, giving resulting mechanical and electrical-conductivity properties and microstructures of the welds. Concludes with illustrated description of pressure-vessel-fabrication procedure. 35 ref.

11741* Production Welding 24ST3 Aluminum Using Slope Control. Robert E. Kemp. *Welding Journal,* v. 31, Aug. 1952, p. 687-691.

Describes some techniques and equipment developed for the

7. *Metals—Welding or Joining*

successful production resistance welding of Al. Micrographs and macrographs.

11742* Resistance Welding Quality Control. Thomas J. Lepito and Robert M. Taylor. *Welding Journal,* v. 31, Aug. 1952, p. 692-698.

Describes quality control in jet-engine fabrication, including chemical analysis and dimensions of material, equipment, machine settings, and testing of completed welds. Experimental work was done on AMS-5510 material. Includes diagrams, macrographs, and micrographs.

11743* Effect of Vibration on Weld Metal. John W. Welty. *Welding Journal,* v. 31, Aug. 1952, p. 361s-366s.

Effects of vibration on microstructural solidification pattern and on mechanical properties of AISI Type 321 and 347 steel during both arc and resistance welding were determined. Apparatus is illustrated; photomicrographs illustrate typical results.

11744* Seam Welding of 0.005-In. Inconel Sheet. E. F. Nippes and John M. Gerken. *Welding Journal,* v. 31, Aug. 1952, p. 366s-370s.

It was found that 0.005-in. annealed Inconel could be seam welded using an electrode force of 75 lb. with a low-inertia moving electrode, a current of 1350-1425 amp., a sequence of ½ cycle "on", 4 cycles "off" with a 60 cps. supply and 40 welds per in. Describes special seam-welding machine with a low-inertia head. Double-seam welds were made with the 2nd seam at the edge of one sheet.

11745* Porosity in Mild Steel Weld Metal. Donald Warren and R. D. Stout. Welding Journal, v. 31, Aug. 1952, p. 381s-386s.

Reviews literature on each of the factors affecting the above. 39 ref.

11746* Evaluation of the Circular-Patch Weld Test. John E. Hockett and L. O. Seaborn. *Welding Journal,* v. 31, Aug. 1952, p. 387s-392s.

Applicability of above test as a means of determining weldability was investigated. The type of specimen used has high biaxial residual stresses which promotes cracking. Exploration of the possibility of utilizing such a test to predict probability of cracking or brittle behavior under external load, as in service, was the primary objective of the investigation. This was done by bending 4 series of unnotched Unionmelt welded mild-steel patches and one set of manually welded patches at several temperatures to determine what effects welding variables had on transition temperature. 24 ref.

11747* A Survey of Arc Welding in Gaseous Atmosphere. *Welding Journal,* v. 31, July 1952, p. 349s-352s. (Translated from *Soudure et Techniques connexes,* v. 5, 1951, p. 179-181.)

Historical review of successful and unsuccessful attempts to provide arc shielding of the molten weld metal from atmospheric contamination. 26 ref.

11748 High Quality Pipe Butt Welding Without Backing Strips. A. J. P. Tucker. *Welding and Metal Fabrication,* v. 20, July 1952, p. 253-257.

Describes a method of making fusion butt welds in mild-steel piping by a metal-arc process which allows good control of root penetration. Methods of testing the welds and uses of the process are discussed. Applications of the argonarc process to the welding of piping of 18% Cr-8% Ni, and the 3% Cr-Mo type are also described. Shows that, for these materials, argonarc welding has several advantages over metal-arc welding. Photographs and tables.

11749 Welding of Heat-Resistant Steels. H. F. Tremlett. *Welding and Metal Fabrication,* v. 20, July 1952, p. 258-261; Aug. 1952, p. 299-303.

Discusses various aspects of heat-resistant steels as they affect the engineer. Resistance to scaling is considered and also the effect of alloying elements such as Cr, Ni, and Ti upon the scaling resistance, strength at temperature, and creep resistance. Tables and graphs.

Miscellaneous Publications

11750 Influence of Hygroscopic Moisture of Coverings Upon Some Properties of Welding Electrodes. E. D. Lonskii. Henry Brutcher, Translation 2814, 7 pages. (From *Avtogennoe Delo,* v. 22, Dec. 1951, p. 17-19.)

Previously abstracted from original.

11751 Lead-Tin Alloy Plating for Solderability. J. W. Cuthbertson. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 99-106; disc., p. 125-135. (TS670 E25j)

Reviews the present position of electrodeposited tin as a medium to aid soldering of brass, copper, and steel. Discusses possible advantages of Pb-Sn alloy coatings, history, constitution of plating baths, addition agents, operating conditions, and solderability of deposits. 10 ref.

See also:
11663 (welding Mg)
12173 (specifications for brazing)
12292 (cold welding of metal tubes)
12395 (structural data on welding)
12833 JIC standards for reistance-welding transformers)

8. METALS—THERMAL TREATMENT

11752 How to Set Up a Heat Treating Department. W. G. Patton. *Iron Age,* v. 170, Aug. 7, 1952, p. 109-113.

Equipment and procedures of Teer, Wickwire & Co., Jackson, Mich. 150-175 tons of king pins, aircraft-valve rocker arms, track link pins, hydraulic ram assemblies and other critical parts are treated. Included in basic equipment are 2 Homo-Carb furnaces, 3 salt baths, a tempering furnace, oil and caustic quench baths, and a cooling tower. Automatic controls, recording equipment, and special handling devices are built in. Results on carbon and alloy steels have been excellent.

11753 Prediction of End-Quench Hardness in Steels Simplified. M. A. Orehoski and J. M. Hodge. *Iron Age,* v. 170, July 17, 1952, p. 125-129.

Improved method for estimating Jominy end-quench curve from the first 1/16 in. to the region of 50% martensite. The method is not too accurate for boron steels. Numerous graphs and tables.

11754 Better Heat Treating Born in Research. C. L. West. *Iron Age,* v. 170, Aug. 14, 1952, p. 134-136.

Previously abstracted from *Steel Processing,* v. 38, July 1952, p. 344-350.

11755 The Rapid Softening of Cold-Drawn Austenitic Stainless Steels. F. A. Hodierne and C. E. Homer. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 249-253.

A detailed study was made of the effects of softening treatment in properties and structure of 5 different stainless steels. Includes corrosion resistance, hardness and microstructure. Recommended conditions for rapid softening are described.

11756 Isothermal Heat Treatment of Meehanite Metal. C. R. Austin. *Metal Progress,* v. 62, Aug. 1952, p. 109-112.

Describes establishment of S-curve of above material. From the results, selected heat treatments were recommended for investigation on effects of interrupted quenching treatments in terms of both Brinell hardness and tensile strength of the heat-treated irons. Jominy end-quench data obtained after austenitizing at 1560 and 1785°F. show effect of maximum temperature of heating on hardenability. Data are compared with those for high-Si spring steels.

11757 Precipitation Hardening of Hot Working and High Speed Steels. Kehsin Kuo. *Research,* v. 5, July 1952, p. 339-340.

A study of the carbide reactions which occur during tempering of molybdenum and tungsten steels.

11758 Value of Furnace Research Shown at Electric Furnace. C. L. West. *Steel Processing,* v. 38, July 1952, p. 344-350.

The research department begun in 1931 at the Electric Furnace Co., Salem, Ohio, has proven very valuable in its constant study of materials for furnace construction, determining temperatures, cycles and furnace atmosphere required in the heat

treatment of metal products. Studies made there have also indicated the most suitable design and size of furnace and gas-atmosphere equipment for specific production requirements. Furnace research equipment is described and discussed in detail. Photographs.

11759 Heat-Treating and Machining of Boron Steels. Part I. J. D. Graham. *Tool Engineer*, v. 29, July 1952, p. 46-48; Aug. 1952, p. 58-60.

Covers machining as related to heat-treatment and isothermal transformation. Discussion of medium-carbon B steel. Tables and graphs.

11760* Flame Hardening Turret-Ring Ball Races. B. A. Schevo and Z. J. Fabrykowski. *Welding Journal*, v. 31, Aug. 1952, p. 699-703.

Fixture and process for successfully flame hardening FS4140 steel ball races of vehicular turret rings in vertical position developed at Detroit Arsenal. Tables, diagrams, and illustrations.

Miscellaneous Publications

11761 Hardenability of Steel With Small Boron Contents. (Some Problems of the Physics of Hardenability). S. M. Vinarov. Henry Brutcher, Translation No. 2819, 3 pages. (From *Zhurnal Tekhnicheskoi Fiziki*, v. 19, Feb. 1949, p. 243-250.)

Previously abstracted from original.

11762 Diffusion of Carbon and Nitrogen Into Steel at High Temperatures. D. A. Prokoshkin and P. M. Arzhanyi. Henry Brutcher, Translation 2871, 12 pages. (From *Trudy Moskovskogo Inst. Stali im. I. V. Stalina, "Symposium XXX, Structure and Properties of Steel,"* Metallurgizdat, Moscow), 1951, p. 241-255, 12 pages.

Experimental study of effects of cyaniding temperature, bath composition, and cyaniding time upon distribution of C and N in diffusion layer, and of structure and properties of cyanide case. One carbon and one low-alloy steel were studied. Part played by so-called "neutral salts" in the cyaniding bath. Results of microexamination, electron-diffraction, and x-ray studies of diffusion layer. Data on hardness, tensile, and impact properties of cyanided and carburized steels. Results of bending fatigue tests on specimens with different cyanide-case thicknesses.

See also:

11672 (pack annealing of bar steel)
11680 (heat treatment of forgings)
11702 (annealing of stainless steel)
11807 (annealing of nodular cast iron)
11911 (heat treatment of boron-steel gears)
11917 (strain-temperature history vs. stress-strain for ingot iron)
12139 (heat treatment of springs)
12386 (heat treatment of bevel gears)
12958 (annealing furnace fires extinguished by boron trichloride)

9. CLEANING, FINISHING, AND COATINGS—METALLIC

11763 How to Select Abrasives for Blast Cleaning Metals. V. F. Stine. *American Foundryman*, v. 22, Aug. 1952, p. 39-41.

Deals with the selection of this best abrasive, considered in terms of 4 primary factors; type of metal to be cleaned; shape of the part; kind of material to be removed; and surface finish desired.

11764* Experiments on Protective-Gas Annealing, Instead of Pickling, in Sheet-Steel Enameling. (German.) W. Kerstan. *Berichte der Deutschen Keramischen Gesellschaft e. V und des Vereins Deutscher Emailfachleute e. V.*, v. 29, Mar. 1952, p. 81-87.

Experiments revealed great advantages of above over pickling. Photographs, tables, and photomicrographs.

11765 A Growing Need for Clad Metals Replaces Hand Methods With a Bonding Machine. *Business Week*, Aug. 16, 1952, p. 61-62, 64, 66.

Describes economic and technological status of clad metals. Knapp Mills, Inc., Long Island City, N. Y., and American Cladmetals Co., Carnegie, Pa., are the principal producers. Illustrates automatic machinery which is giving 10 times the output of hand welding-torch methods previously used.

11766* Chromizing. Shigetomo Ueda. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 59-60.

Reports on experiments on pure iron and low-carbon steel treated by means of the chromous chloride process and of carbon steel treated by means of the Cr-powder process.

11767 Deposition of Conducting Films on Glass. *Chemical Age*, v. 67, July 5, 1952, p. 13-15.

Compares British and American work on the above.

11768 Electrolytic Titanium. Abner Brenner and Seymour Senderoff. *Journal of the Electrochemical Society*, v. 99, Aug. 1952, p. 223C-224C.

Reveals preliminary findings in the problem of finding an electrolytic method for producing Ti electrodeposits or Ti powder. Micrographs.

11769* Optical Determination of the Quality of Metallic Surfaces. J. Elze and H. Gruss. *Engineers' Digest*, v. 13, July 1952, p. 211-212. (Translated and condensed from *Metalloberfläche*, ser. A, v. 6, Feb. 1952, p. A17-A23.)

Previously abstracted from original.

11770 Enameling of Aluminium. C. R. Sigler. *Finish*, v. 9, Aug. 1952, p. 35-37, 56-57.

Previously abstracted from *Ceramic Industry*, v. 57, Nov. 1951, p. 61-62, 109-111.

11771 The Use of Alkalis in Cleaning Processes. Part 2. P. G. Clements and T. Kennedy. *Industrial Chemist and Chemical Manufacturer*, v. 28, July 1952, p. 301-305.

Effect of alkaline detergents on a wide variety of materials of construction, both metallic and nonmetallic, is considered. 13 ref.

11772 Phosphoric Acid Treatment Improves Paint Adherence, Corrosion Resistance. W. G. Patton. *Iron Age*, v. 170, July 17, 1952, p. 138-139.

Discusses the Nielizing process for corrosion control and its use in ferrous metal pre-paint conditioning. This process uses a phosphoric acid base.

11773 Uses for Industrial Coated Abrasives Expand. Parts I-II. John E. Hyler. *Iron Age*, v. 170, July 24, 1952, p. 98-101; July 31, 1952, p. 91-95.

Part I discusses a number of different types of coated abrasives, their uses and recent improvements. Part II includes uses of backstand equipment. Abrasive belt equipment is available for tool grinding, centerless grinding, polishing of metal sheets or metal in strip form.

11774 Automatic Acid Bright Dip Has Many Advantages. K. W. Bennett. *Iron Age*, v. 170, July 24, 1952, p. 108-110.

The continuous bright-dip machine operated by Bastian-Blessing Co., Chicago, for cleaning of small brass parts is described. Unit output and floor plan are discussed. Illustrated.

11775* Barrel Finishing Precision Turbo-Jet Parts. Dudley J. Kaharl. *Machinery* (American), v. 58, Aug. 1952, p. 145-151.

Procedures and equipment of Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn. Materials are steel, aluminum, stainless steel, brass, and magnesium.

11776* Mollerizing Iron and Steel Provides Aluminum Surfaces. *Machinery* (American), v. 58, Aug. 1952, p. 179-181.

Al can be united permanently with the surfaces of steel or iron parts, regardless of intricate shapes, by above process, in order to fully protect work-pieces from various types of corrosion. The process consists briefly of immersing the work-pieces to be treated in an electrically heated salt-bath furnace after the parts have been thoroughly cleaned and pickled. The bath has a layer of molten Al on top from 2-4 in. in depth. When the parts have reached the temperature of the bath, approximately 1500°F., they are held for a short period, then withdrawn through the molten Al and consequently receive a coating of Al on all exposed surfaces. Illustrated.

9. *Cleaning, Finishing, and Coatings—Metallic*

11777* Rebuilding Engine Cylinders and Liners; Worn Machine Surfaces Built up With Iron and Porous Chromium. Fred M. Burt. *Metal Finishing*, v. 50, Aug. 1952, p. 67-72.

Describes and illustrates use of the "Vanderloy M" Fe plating and "Porus-Krome" processes by Spar-Tan Eingineering Co., Los Angeles, for above work. Includes micrographs showing structure of the deposits.

11778* A Metal Cleaning Test Using Radioactive Steric Acid as Soil. Part II. J. W. Hensley, H. A. Skinner, and H. R. Suter. *Metal Finishing*, v. 50, Aug. 1952, p. 77-80, 83.

Describes test apparatus and procedure. Cleaning test results for removal of stearic acid films from steel, using different agents, are charted and tabulated.

11779 Zinc Coating—Galvanizing Baths. *Metal Industry*, v. 81, July 18, 1952, p. 51-52.

Second part of report on 2nd International Conference on Hot-Dip Galvanizing, Düsseldorf, Germany. Briefly reports on two papers and accompanying discussion: "The Potential Behaviour of the Iron-Zinc Alloy Layer of Galvanized Steel in Various Hot Aqueous Solutions", R. C. Weast; and "The Effect of Aluminium and Iron on the Structure of Galvanized Coatings", M. A. Haughton.

11780 The Hardness of Chromate Films; An Investigation of Chromate Passivated Cadmium Plate. A. J. W. Beck. *Metal Industry*, v. 81, July 25, 1952, p. 69-70.

Briefly described. Graphs.

11781* The Porosity of "Eloxidized" Layers. (German.) Oswald Kubaschewski and Arvid von Krusenstjern. *Metalloberflache*, ser. A, v. 6, July 1952, p. A97-A102.

Discusses the protective effect of various oxide coatings, and the formation of macropores and micropores in anodizing of pure Al. Various methods for judging the porosity of a layer are indicated. Results are interpreted. Micrographs.

11782 A New Solution for the Electrolytic Polishing of Copper and Copper-Base Alloys, Particularly Tin Bronze. E. C. W. Perryman. *Metallurgia*, v. 46, July 1952, p. 55-57.

Addition of concentrated H_2SO_4 to the orthophosphoric acid solution normally used is recommended.

11783 Quantitative Measurement of Adhesion of Electrodeposited Metals. (Concluded.) H. C. Schlaupitz and W. D. Robertson. *Plating*, v. 39, Aug. 1952, p. 862-864, 932.

Gives details of modified nodule method. Presents summary and conclusions. 18 ref.

11784 Physical Properties of Electrodeposited Metals. I. Nickel. 3. The Effect of Plating Variables On The Structure and Properties of Electrodeposited Nickel. A. Brenner, Victor Zentner and C. W. Jennings. *Plating*, v. 39, Aug. 1952, p. 865-894, 899-927, 933.

A comprehensive report. Main objective was to accumulate data on those mechanical properties of nickel electrodeposits which are of immediate value in engineering applications. A further aim was to collect data on other properties, such as density and electrical, magnetic, and thermal properties, which may be of value in determining the suitability of Ni deposits for special applications. A subsidiary but important purpose was to correlate the physical and mechanical properties of Ni deposits with their conditions of deposition, structure, and chemical composition and to show the correlations existing between the properties themselves. Extensive tabular data, graphs, and micrographs. 209 ref.

11785* Chromium Plating Baths Containing Fluorides or Fluosilicates. T. A. Hood. *Plating Notes*, v. 4, Apr. 1952, p. 31-45.

Previously abstracted from *Metal Finishing*, v. 50, June 1952, p. 103-106, 112.

11786 Hard Chromium Coatings for Ferrous Parts. G. A. Samuel. *Product Engineering*, v. 23, Aug. 1952, p. 164-166.

English process called Chromizing. Similar to conventional pack carburizing, it consists of placing parts in a carburizing box containing a Cr-rich powder and heating the sealed box in an ordinary furnace for 6-12 hours. The alloy that forms on the parts is within the category of high-Cr steels, yet it is not a substitute for stainless, nor is it a replacement for Cr plating. Its field of application, is between those of stainless and plating, and slightly overlaps in each case.

11787* High Operating Efficiency in Job Lot Finishing of Small Parts. Frank L. Bonem. *Products Finishing*, v. 16, Aug. 1952, p. 18-28, 30.

Facilities at Shakeproof, Inc., division of Illinois Tool Works for finishing of such small parts as gears, and screws and other fastening devices. Details of automatic Zn and Cd plating; phosphating; barrel plating with Zn, Cd, and Cu; tinning and miscellaneous finishes; washing; and maintenance and control. Photographs and layout diagram.

11788* Electropolishing of Sliver Shows Cyclic Behavior. *Products Finishing*, v. 16, Aug. 1952, p. 68, 72, 74, 78. (From paper by H. T. Francis and W. H. Colner, *Journal of the Electrochemical Society.*)

Study of effect of voltage regulation on the cycling observed in the anodic electropolishing of silver in a cyanide solution. Circuit diagram.

11789* Anisotropic Lattice Distortion. E. C. Williams. *Research*, v. 5, Aug. 1952, p. 392-393.

Discusses calculation of the above. Typical results are charted.

11790* Thin Metal Films—New Methods for Their Production. Richard B. Belser. *Research Engineer* (Georgia Institute of Technology), v. 1, May 1952, p. 7-8, 21-24.

Discusses new methods of film-forming and some modern applications. Considers the following metals: Au, Cu, Sn, Zn, Pd, Pb, Cd, Ag, Pt, Al, Ni, Ti, Zr, Cr, and In. Illustrations include photomicrographs.

11791* Micrographic Determination of the Grain Size of Aluminum and Its Alloys. (French.) Jean Hérenguel. *Revue de l'Aluminium*, v. 29, June 1952, p. 221-229.

Examines the application, to Al and its alloys, of methods of intergranular attack and grain orientation for determination of grain size. Illustrated by typical micographs. 11 ref.

11792* Anodic Protection of Light Alloy Construction. (French.) G. Moressee. *Soudure et Techniques connexes*, v. 6, May-June, 1952, p. 123-128.

Discusses treatment of resistance-welded pieces to assure their protection against corrosion; anodic oxidation, sulfuric acid, and chromic acid processes. Includes tabular data.

11793* Galvanizing in the United States of America. (German.) *Stahl und Eisen*, v. 72, July 3, 1952, p. 805-833.

The following articles plus accompanying discussion: "Hot Dip Galvanizing of Tubes", Rolf Haarmann; "American Methods of Zinc Coating Steel Wire and Steel-Wire Products", Peter Hillesheim; and "Galvanized Sheet and Strip", by Wilhelm Brachmann.

11794 The Evolution of the Modern Hot-Dip Galvanizing Pot. Wallace G. Imhoff. *Wire and Wire Products*, v. 27, Aug. 1952, p. 769-774, 828-832.

Describes various types of pot designs used, showing their progressive changes down to the present time. Graphs. 32 ref.

Miscellaneous Publications

11795 Corrosion Protection by Cold Phosphating Process. V. S. Lapatukhin. Henry Brutcher, Translation 2826, 22 pages. (From *Zhurnal Prikladnoi Khimii*, v. 24, Apr. 1951, 373-382.)

Previously abstracted from original.

11796 On Porosity and Rate of Formation of Electro-Phosphate Coatings. W. Machu. Henry Brutcher, Translation 2831, 15 pages. (From *Archiv für Metallkunde*, v. 3, Aug. 1949, p. 278-281.)

Comparative study of porosity of phosphate coatings produced with and without a.c. polarization during the phosphating process. Fundamentals of electrophosphating. Operating conditions of Electro-granodizing process. Additive effect of toners and electric current. Study of rate of coating formation and of

porosity of electrophosphate coatings from Granodizing and Bonderizing baths. 14 ref.

11797 Interpretation of Specifications for Electroplated Coatings. S. Wernick. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 221-227; disc., p. 227-235. (TS670 E25j)

Discusses problems in establishment of specifications fair to both consumer and producer. Covers determination of thickness of deposits; microstructure; adhesion and porosity; and performance specifications.

11798 Factors Influencing the Design of Automatic Plating Plant. A. Smart. *Journal of the Electrodepositors' Technical Society*, v. 27, 1951, p. 227-288; disc., p. 289-291. (Preprint.) (TS670. E125j u-27)

Considers above factors, follows through in detail the various steps in the design of one rather large installation for electrogalvanizing steel window frames, and shows the manner in which the design is affected by these influences. Photographs.

See also:
11643 (enamel defects on cast iron)
11651 (enameling cast iron)
11663 (electroplating Mg)
11683 (finishing stainless steel)
11702 (finishing of stainless steel)
11730 (brazing and polishing high-Cr stainless)
11751 (Pb-Sn alloy plating)
11878 (oxide-film formation in intermetallic contacts)
11913 (effect of H_2 generated during electroplating on steel embrittlement)
11936 (steel plasticity vs. surface-finishing quality)
11963 (coatings for water-system corrosion prevention)
11978 (protective metallic coatings)
11983 (resin- and bituminous-base coatings to combat corrosion)
11993 (Sn coatings on different metals)
12139 (plating and phosphating of springs)
12154 (ultrasonics for cleaning metals)
12158 (evaporation coating of Ag)
12322 (ceramic coatings on metal)
12335 (metallic coatings for ceramics)
12817 (thin metallic films—symposium)
12960 (ion exchange in pickling and electroplating bath recovery)

10. METALLOGRAPHY AND PRIMARY STRUCTURES

11799* The Structure of β(AlMnSi)-Mn_3SiAl_9. (English.) Keith Robinson. *Acta Crystallographica*, v. 5, July 1952, p. 397-403.

X-ray examination of single crystals of ternary compounds occurring in the Al-Mn-Si system forms part of the research of structural work on Al-rich intermetallic compounds, being carried out in conjunction with the metallographic examination of alloys by the University of Birmingham, England. Tables and graphs. 15 ref.

11800* The Iron-Nitrogen System: The Crystal Structures of ε-Phase Iron Nitrides. (English.) K. H. Jack, *Acta Crystallographica*, v. 5, July 1952, p. 404-411.

Describes part of a chemical and structural investigation of binary and ternary interstitial alloys of Fe, C, and N_2. 15 ref.

11801* Orientation Relationships Between Cementite and Iron. (French.) J. J. Trillat and S. Oketani. *Acta Crystallographica*, v. 5, July 1952, p. 469-471.

Single-crystal films of α-Fe were formed by evaporation on to a cleavage face of NaCl heated to 600-700°C. followed by annealing at 700°C. Preparations of α-Fe were carburized at 500°C. in an atmosphere of $CO+H_2$ and then examined by electron diffraction. Results of study are discussed. 12 ref.

11802* Unidimensional Disorder in SiC and Its Influence on the Diffraction Intensity of X-Rays. (French.) R. Gevers. *Acta Crystallographica*, v. 5, July 1952, p. 518-524.

Theory is developed for the x-ray scattering by SiC crystals of the usual 4-, 6- and 15-layer types, which show order in two translation directions but disorder in the third direction.

11803* The Habit Plane of the Zirconium Transformation. (English.) A. J. J. van Ginneken and W. G. Burgers. *Acta Crystallographical*, v. 5, July 1952, p. 548-549.

Results of investigation are presented and discussed.

11804* Some Recent Developments in Metallurgical Microscopy. R. C. Gifkins. *Australasian Engineer*, May 7, 1952, p. 63-70.

An illustrated survey. Equipment, procedures, and typical results. 30 ref.

11805 The Metallographic Preparation of Porous and Friable Coatings. D. Caplan and P. E. Beaubien. *Canadian Journal of Technology*, v. 30, July-Aug. 1952, p. 211-213.

During the metallographic examination of the scale layers on heat-resistant alloys, great difficulty was experienced in preparing polished cross sections because of the tendency of the porous and fragile oxide layers to disintegrate during cutting, mounting, grinding, and polishing. The usual method of mounting in plastic by pressure molding not only crushed the layers but did not permit the supporting plastic to enter into the interstices. Describes a double vacuum-impregnation technique using two liquid plastics which gave satisfactory results.

11806* Some Corrections to Cast Iron Diagrams of Maurer and Others. Ichiro Iitaka. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 1-2.

Indicates corrections deemed necessary.

11807* Some Experiments on the Structure Diagram and the Annealing of Spheroidal Graphite Iron. Nobuhisa Tsutsumi. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 6-10.

Using synthetic iron containing no appreciable amounts of Mn, P, and S impurities metallographic examinations were made in the as-cast and annealed condition on irons containing 2.4-4.5% C and 0-4.6% Si. Tables, graphs, and micrographs.

11808* Spheroidal Graphite Cast Iron. Takaji Kusakawa. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 11-14.

Effects of Ca on microstructure and mechanical properties were investigated.

11809* Research on Rapid Heating of Steels. Kiyoshi Yokota and Nobuhiro Iguchi. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 56-58.

Results of dilatometric and micrographic studies on Swedish mild steels. Illustrated.

11810 The Thorium-Selenium System. R. W. M. D'Eye, P. G. Sellman, and J. R. Murray. *Journal of the Chemical Society*, July 1952, p. 2555-2562.

Thermal, metallographic, x-ray, and chemical analysis has unambiguously identified 4 phases in above system: ThSe, Th_2Se_3, Th_7Se_{12}, and $ThSe_2$. Gives detailed information on lattice parameters and structures. Tables, graphs, and photomicrographs.

11811 The Constitution of Nickel-Rich Alloys of the Nickel-Chromium-Titanium System. A. Taylor and R. W. Floyd. *Journal of the Institute of Metals*, v. 80, July 1952, p. 577-587.

The binary Ni-Cr and Ni-Ti systems were re-examined by x-ray diffraction and micrographic techniques, and new equilibrium diagrams for them are presented. A detailed investigation was also carried out on Ni-rich Ni-Cr-Ti alloys from which partial equilibrium diagrams corresponding to the 750, 1000, and 1150°C. isothermals were constructed. The boundary separating magnetic from non-magnetic ternary γ-phase alloys at 20°C. is indicated in the equilibrium diagram. 37 ref.

11812 The Constitutional Diagram of the Chromium-Tungsten System. H. T. Greenaway. *Journal of the Institute of Metals*, v. 80, July 1952, p. 589-592.

The above was investigated by metallographic x-ray, and thermal analysis. The liquidus rises, slowly at first and then more rapidly, from the freezing point of Cr towards that of W. Above 1500°C., the solid alloys consist of a continuous series of solid solutions; below 1500°C., the single phase breaks down into two limited solid solutions, which thus form a solubility gap in the diagram.

10. *Metallography and Primary Structures*

11813 Lattice-Spacing Relationships in Aluminium-Rich Solid Solutions of the Aluminium-Magnesium and Aluminium-Magnesium-Copper Systems. D. M. Poole and H. J. Axon. *Journal of the Institute of Metals*, v. 80, July 1952, p. 599-604.

The above were re-invesigated, using 2 samples of Mg of different purities. Increasing the purity of the Mg reduces curvature of the relationship at low concentrations of Mg and causes the linear portion of the curve to become more steep. The Al-rich Al-Mg-Cu solid solution was also investigated, using Mg of high purity. 11 ref.

11814 Factors Affecting Equilibrium in Certain Aluminium Alloys. E. C. Ellwood. *Journal of the Institute of Metals*, v. 80, July 1952, p. 605-608.

Lattice spacings and densities of solid solutions of Cu, Mg, and Ag in Al were measured at 25°C. No anomalies were found in the Al-Cu solution. In the Al-Mg solution, the slight curvature in the lattice-spacing/composition curve reported by Axon and Hume-Rothery is confirmed, and vacant sites are formed in the solid solution. It is deduced that anomalies are the result of Brillouin-zone overlap.

11815 The Factors Affecting the Formation of 21/13 Electron Compounds in Alloys of Copper and of Silver. W. Hume-Rothery, J. O. Betterton, and J. Reynolds. *Journal of the Institute of Metals*, v. 80, July 1952, p. 609-616.

An attempt was made to discover the factors that control the composition limits of phases with the γ-brass structure in different alloy systems. The Brillouin zone of the structure is described. Data for Cu-Al and Cu-Ga alloys show that, when the electron concentration reaches about 1.70, atoms begin to drop out of the structure in such a way that the number of electrons per unit cell remains constant. The data for all the systems indicate that this is a critical electron concentration beyond which a normal structure with its full complement of atoms cannot exist. 19 ref.

11816 The Lattice Spacings and Densities of Gold-Nickel Alloys at 25°C. E. C. Ellwood and K. Q. Bagley. *Journal of the Institute of Metals*, v. 80, July 1952, p. 617-619.

Anomalies in lattice spacing and density were found in the solid solutions of Au and Ni. It is concluded that Brillouin-zone overlaps occur in the solid solution, accompanied by formation of vacant lattice sites. By anology with other Au-rich solid solutions and from the calculation by Jones and Mott of the N(E) curve for the face-centered-cubic metal Cu, it is concluded that Ni has a valency of 3.2 when dissolved in Au up to 60 at. %.

11817 Develop New Technique For Metal Structure Study. R. B. Pond and N. K. Chen. *Iron Age*, v. 170, Aug. 7, 1952, p. 122-126.

Describes motion-micro study, an unusual technique developed at Johns Hopkins University. A motion picture camera hooked to a microscope was used to take pictures of liquid-solid transformations of low-melting-point alloys. A special micro-tensile testing machine, equipped with strain gages and Dynalog recorder, was developed to deform and measure the extent of strain. This combination setup was used to study plastic deformation of high-purity Al crystals grown by gradual solidification from the liquid metal.

11818 X-Ray Investigation of the Epsilon Phase in an Fe-Mn Alloy. J. Gordon Parr. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 137-141.

X-ray investigation of above alloy containing 18.5% Mn confirms that the ϵ phase has a close-packed hexagonal structure, but refutes a previously assumed crystallographic relationship between the γ and ϵ phases. Relative amounts of the α, γ, and ϵ solid solutions in heat-treated powder specimens were determined by an x-ray method, and led to the conclusion that the ϵ phase is produced by a process of athermal nucleation; it is not an equilibrium phase. Tables and graph. 14 ref.

11819 Microstructural Changes in the High-Alloy Valve Steel XCR. B. Cina. *Journal of the Iron and Steel Institute*, v. 171, July 1952, p. 229-237.

To study the complex diffusion processes involved in the approach to equilibrium of a Cr-Ni-Mo-C valve steel (24% Cr, 5% Ni, 2.5% Mo, 0.45% C) at temperatures up to 1150°C., the microstructural changes produced by heat-treatment at several temperatures were studied at room temperature by optical microscopy, x-ray diffraction, and hardness determinations, and a correlation found between results obtained by the 3 methods. Tables and 4 pages of photomicrographs. 15 ref.

11820 Modified Picral for Higher Alloy Steels. A. E. Nehrenberg. *Metal Progress*, v. 62, July 1952, p. 91-92.

Experiences in use of picral solution modified by addition of HCl. Photomicrographs of etched stainless steel are shown.

11821 Effect of Cr on Eutectoid Carbon. H. S. Blumberg. *Metal Progress*, v. 62, Aug. 1952, p. 93.

Proposes a simple empirical formula which approximates the values reported by various investigators—Monypenny, Bain, Reed, Russel, and Aall: % Carbon in Eutectoid of Plain Chromium Steels = 6 divided by %Cr + 7. Calculated results from this formula and data shown by various authorities are tabulated.

11822 Discard This Etchant Promptly. L. H. Satz. *Metal Progress*, v. 62, Aug. 1952, p. 96.

Recommends discarding of the "mixed acids in glycerol" etchant of stainless steels soon after preparation. On standing for extended periods a dangerous exothermic reaction takes place.

11823* The Unit Cell and Brillouin Zones of $Ni_4Mn_{11}Al_{40}$ and Related Compounds. Keith Robinson. *Philosophical Magazine*, ser. 7, v. 43, July 1952, p. 775-782.

Tables and graphs. 10 ref.

11824* The Fine Structure of Bragg Reflections, and Imperfections in Metallic Crystals. Honoré Lambot and Lawrence Vassamillet. *Revue de Métallurgie*, v. 49, June 1952, p. 408-410.

Proposes a simple method for obtaining images of crystal defects, using monochromatic radiation. Details of the investigation are described. Micrographs.

11825* The Existence of a New Phase in Chromium-Molybdenum Steel. (French.) L. Habraken. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Science et des Arts appliqués a l'Industrie*, ser. 9, t. 8, July 1952, p. 281-284.

Describes and illustrates above phase, giving details of its investigation. Role of this phase in creep resistance at elevated temperatures is discussed.

11826 Diffraction by a Semi-Infinite Metallic Sheet. T. B. A. Senior. *Proceedings of the Royal Society*, ser. A, v. 213, July 22, 1952, p. 436-458.

Shows that, with assumption of suitable boundary conditions, the problem of diffraction at a metal sheet is capable of exact solution. Corresponding to each of two fundamental polarizations, a pair of Wiener-Hopf integral equations is derived from which to determine electric and magnetic currents present in the sheet. One of these equations is subjected to a rigorous solution, and from it the solutions of the other 3 are deduced by symmetry considerations. Use of the generalized method of steepest descent then serves to determine the diffracted fields. The case of a circularly polarized incident wave is also briefly discussed. 28 ref.

11827 Microscopic Studies of Tungsten Wire. Robert B. Reid. *Sylvania Technologist*, v. 5, July 1952, p. 75-76.

Photomicrographs presented show the effects of fissures and advanced grain growth in tungsten wire and the contamination of tungsten filaments due to contact with metal or lubricating-oil vapor.

11828* On the Lattice Vibrations of a Binary Superlattice Alloy. (English.) Yoshio Shibuya, Yoshiichi Fukuda, and Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Feb. 1951, p. 1-12.

Results of a theoretical calculation of the vibrational modes of a β-brass alloy (CuZn) for the state of any degree of order in accordance with the method of Born and von Kármán are given. The 6th order secular equation obtained was solved

with respect to the 3 principal directions (100), (110), and (111). The v-σ curves for the state of several specified values of degree of order in the 3 principal directions are plotted.

11829* Some Theoretical Aspects About the Second Order Superlattice in Body Centered Cubic Lattice. (English.) Hiroshi Sato. *Science Reports of the Research Institutes Tohoku University*, ser. A, v. 3, Feb. 1951, p. 24-33.

11830* Study on the Superlattices of Ternary Alloys by X-Ray. (English.) Shiro Ogawa and Yoshinobu Matsuzaki. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Feb. 1951, p. 50-54.

The ternary system Fe-Al-Si, which contains the industrially important ferromagnetic alloy "Sendust" and has two superlattices of the same type on the Fe-Al and Fe-Si sides; and offers various problems in connection with superlattice theory. The composition range in which the superlattice of the 3:1 type can exist was investigated. The results showed that all ferromagnetic singularities were found in this composition range.

11831* Research on the Copper-Rich Solid Solution in Cu-Mn Binary System. (English.) I. Masayuki Kawasaki, Kenkichi Yamaji, and Osamu Izumi. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Feb. 1951, p. 66-77.

Alloys in Cu-Mn system containing up to 61.3% Mn were investigated from various standpoints, namely microstructure, hardness changes due to various heat treatments, temperature dependence of electric resistivity and thermal expansion, and density at room temperature.

11832* On the Equilibrium Diagram of Iron-Manganese System. (English.) Hiroshi Yoshisaki. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 137-150.

Study was carried out with alloys containing 50-100% Mn, by means of measurements of thermal expansion, magnetic analysis, microscopic examination, and x-ray examination. Numerous micrographs.

11833* On the Liquidus Line of Fe-Mn Alloys. (English.) Mitsutake Isobe. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 151-154.

Equilibrium diagram of above alloys containing more than 50% Mn was studied by means of thermal analysis. Tables, graphs, and discussion.

11834* Data on the Diffusion of Small-Angle X-Rays by the Structure of Age-Hardened Alloys. Case of Aluminum-Silver Alloys. (French.) A. Guinier. *Zeitschrift für Metallkunde*, v. 43, June 1952, p. 217-223.

Discusses the origin of above diffusion, with special emphasis on defective crystals. Annealing at high and at low temperatures is described. Graphs and micrographs. 16 ref.

Miscellaneous Publications

11835* Observations on Drastically Quenched Iron-Carbon Melts. G. Falkenhagen and W. Hofmann. Henry Brutcher, Translation 2870, 4 pages. (From *Archiv für das Eisenhuttenwesen*, v. 23, Jan.-Feb., 1952, p. 73-74.)

Previously abstracted from original.

See also:

11612 (subsurface ingot structure of semikilled steel)
11665 (nonmetallic nuclei vs. graphite structure of cast iron)
11705 (toolsteels and standard steels for twist drills)
11740 (microstructure of Cu welds)
11755 (softening treatment vs. microstructure of stainless)
11784 (microstructure of electro-deposited Ni)
11789 (anisotropic lattice distortion)
11865 (theory of grain-boundry structure)
11890 (phase diagrams of Al-Zn-Mg, Al-Si-Mg, and Al-Cu-Mg)
11905 (Zr effect on structure of superduralumin)
11924 (dislocations and slip planes in metal crystals)
11977 (annealing vs. structure of galvanized steel)
12076 (determination of inclusions in steel)
12091 (calculating structure factors)
12140 (metallography of cemented carbides)
12146 (x-ray microradiography)
12532 (imperfections in crystal structures)

11. METALS—TRANSFORMATIONS AND RESULTING STRUCTURES

11836* Diffusion in Solid Metals. (German.) W. Seith and A. Kottmann. *Angewandte Chemie*, v. 64, July 21, 1952, p. 379-391.

The connection between partial diffusion coefficients determined by radioactive methods and chemical partial diffusion coefficients determined from shifting of markers is described and experimentally verified. Changes in shape and dimension and occurrence of cavities caused by the process of diffusion were examined in the systems Ni-Cu, Ag-Pd, and Fe-Ni. The diffusion mechanism in metallic mixed crystals is discussed in connection with the experimental results. Numerous photomicrographs, tables and graphs. 21 ref.

11837* The Theory of Precipitation Hardening. R. L. Apps. *Journal of the Birmingham Metallurgical Society*, v. 32, June 1952, p. 60-72.

Qualitative review of the above illustrated with diagrams. 18 ref.

11838* The Phenomena of Pre-Precipitation in Aluminum-Silver Alloy. (French.) Christopher B. Walker and André Guinier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 9, 1952, p. 2379-2381.

Proposes a new and more accurate model for interpretation of Al-Ag alloys in their first stage of aging. Diffusion diagrams at various annealing temperatures are discussed .

11839 Related Diffusion Effects of Carbon and Sulphur in Iron at High Temperatures. K. J. Irvine. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 142-147.

Covers: experiments on the penetration of iron sulfide into Armco iron in CO, H_2, or N_2 atmospheres at 1000°C.; similar experiments with Ni, Cu, Monel metal, and plain-carbon steel; and experiments on the relative movement of C and S at high temperatures. The last tests involved carbon steel in CO and in N_2; and free-cutting steel in N_2. The melting of large sulfide particles is considered. Comparison is made with earlier results and industrial implications are given. Photomicrographs.

11840 A Note on the Formation of Undercooled Graphite in High-Purity Iron-Carbon-Silicon Alloys. W. S. Owen. *Journal of the Iron and Steel Institute*, v. 171, July 1952, p. 237-238.

It is shown that the formation of undercooled graphite in vacuum-melted high-purity Fe-C-Si alloys is a result of the decomposition of an undercooled austenite-carbide complex. In general terms, an explanation of the phenomena is suggested. Photomicrographs.

11841 On Diffusionless Transformation in Au-Cd Single Crystals Containing 47.5 Atomic Percent Cadmium: Characteristics of Single-Interface Transformation. Lo-Ching Chang. *Journal of Applied Physics*, v. 23, July 1952, p. 725-728.

Kinetics of single-interface motion in the above were studied. Tables and graphs.

11842 Grain Boundary Diffusion of Zinc in Copper. R. Flanagan and R. Smoluchowski. *Journal of Applied Physics*, v. 23, July 1952, p. 785-787.

In continuation of a previous study of grain-boundary diffusion of Ag in Cu, the diffusion of Zn along grain boundaries of columnar Cu was investigated at various temperatures. Results confirm the influence of angle between the grains on diffusion and indicate an angular dependence of activation energy.

11843 Note on the Strain Aging of Iron Single Crystals. A. N. Holden and F. W. Kunz. *Journal of Applied Physics*, v. 23, July 1952, p. 799.

Several single crystals of high-purity Fe in wire form several inches long and 0.025-in. in diam. were grown for use in internal-friction damping experiments. Tensile tests indicated that these crystals had only very small initial yield points, but were very susceptible to strain aging and exhibited very marked yield-point effects after straining and aging short times at room temperature. Several interesting results are described because it is felt they are pertinent to a theoretical understanding of the strain-aging phenomenon. Graphs.

11. *Metals—Transformations and Resulting Structures*

11844 A Mechanism for Sputtering in the High Vacuum Based Upon the Theory of Neutron Cooling. Frank Keywell. *Physical Review*, ser. 2, v. 87, July 1, 1952, p. 160-161.

A Phillips ion-gauge discharge was used as a source of ions to measure absolute sputtering ratios (number of atoms sputtered per incident ion) for Ag metal bombarded by ions. Mechanism is described. Circuit diagram of apparatus is given.

11845 Theory of Grain Boundary Diffusion. R. Smoluchowski. *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 482-487.

The previously proposed dependence of structure of grain boundaries upon angle of disorientation of the two grains is used as a basis of a quantitative consideration of diffusion along grain boundaries and in particular of apparent activation energies. At small angles in the dislocation range, diffusion is controlled by a volume-diffusion mechanism. At high angles near 45°, the model of a uniform grain boundary is applicable. In the intermediate range, an array of rod-like areas of distorted lattice leads to low or even negative apparent activation energies. Theory is in good agreement with experiemnt. 12 ref.

11846 Effects Associated With the Flow of Vacancies in Intermetallic Diffusion. R. S. Barnes. *Proceedings of the Physical Society*, v. 65, sec. B, July 1, 1952, p. 512-525.

Experiments on the interdiffusion of Cu-alpha-brass and Cu-Ni couples and sandwiches have shown that there is an increase of volume in the diffusion zone as a result of diffusion. A theory is postulated to explain the volume increase. Tables and diagrams.

11847* Study of the Recrystalization of Three High-Purity Aluminums With the Aid of Their Mechanical Properties. B. Nauton. *Revue de Métallurgie*, v. 49, June 1952, p. 453-457.

Reports on investigations on the influence of minute traces of impurities on the temperature of recrystalization. Experimental details are indicated. Tables, charts, and micrographs.

11848* The Behaviours of Fe-Al, Fe-Si and Fe-Al-Si Alloys Considered From the Standpoint of Ferromagnetic Superlattice. I. On the Superlattice Formation in Fe-Al Alloys. (English.) Hiroshi Sato. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Feb. 1951, p. 13-23.

Anomalous properties in superlattice formation in solid solutions of Fe-Al system were theoretically deduced by taking into account the interrelation between formation of ordered atomic arrangement and origination of spontaneous magnetization. The phase diagram for superlattice formation in these binary alloys was also reviewed from this general point of view.

11849* On the Magnetometric Studies of Transformation in Pure Manganese. (English.) Mitsutake Isobe. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Feb. 1951, p. 78-81.

Transformation points in pure distilled Mn were magnetometrically investigated by the modified Weiss method. It was found that the Mn had 4 phases, α, β, γ, and δ, in the solid state; and that the 3 transformation points were 702, 1065, and 1138°C., respectively. The behaviors of these transformations were also clarified.

11850* On the Production of Single Crystals of Zinc, Bismuth and Tin by Sucking up From Their Melts. (English.) Mikio Yamamoto and Jiro Watanabé. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 165-174.

Above procedure was investigated. Effect of growing conditions upon percentage of success and orientations of single crystals produced was studied.

11851* Kinetics of the Age-Hardening of Aluminum-Silver Alloys. III. Radiographic Investigation of the Age-Hardening Process. Richard Glockner, Werner Koster, Johannes Scherb, and Günther Ziegler. **IV. The Atomic Arrangement in Interference Regions of an Age-Hardened Aluminum-Silver Alloy.** (German.) Günther Ziegler. *Zeitschrift für Metallkunde*, v. 43, June 1952, p. 208-216.

Part III describes radiographic investigations on an Al-Ag alloy containing 38% Ag. Purpose of investigations was to coordinate the occurrence of Guinier-Preston bands with kinetic curves. Experimental details are indicated. Results are tabulated and illustrated by radiographs. Part IV discusses atomic arrangement in agreement with lattice structure appearing in radiographs of the initial stages of age-hardening of Al-Ag alloys at low temperatures. Diagrams. 28 ref.

11852* Thermodynamics of Cold Age-Hardening. (German.) Ulrich Dehlinger and Helmut Knapp. *Zeitschrift für Metallkunde*, v. 43, June 1952, p. 223-227.

Discusses the complex conditions arising in supersaturated mixed metallic crystals. Treats particularly negative diffusion and the problem of thermodynamic instability. Theoretical and mathematical. 10 ref.

Miscellaneous Publications

11853 Mechanism of Formation of Flakes in Steel. S. S. Nosyreva. Henry Brutcher, Translation 2768, 7 pages. (From *Stal*, v. 7, no. 1, 1947, p. 49-52.)

Experimental data on role of hydrogen envolved during breakdown of retained austenite during development of flakes in steel. Distribution of hydrogen in steel ingots. Results of analysis of Cr-Ni-Mo steel ingot at different locations. Determination of hydrogen in carbon and low-alloy steels. Effect of decomposition of retained austenite at room temperature and of subzero temperatures on flaking.

11854 Continuous Solid Solutions of Metals of Transition Group of Mendeleev's Periodic System of Elements. I. I. Kornilov. Henry Brutcher, Translation 2775, 6 pages. (From *Doklady Akademii Nauk SSSR*, v. 73, new ser., July 21, 1950, p. 495-497.)

Previously abstracted from original.

11855 Temperature Hysteresis of Pearlite-to-Austenite Transformation During Induction Heating. A. G. Spektor. Henry Brutcher Translation 2776, 10 pages. (From *Zhurnal Tekhnicheskoi Fiziki*, v. 20, Sept. 1950, p. 1136-1140.)

Formulation of quantitative theory of temperature hysteresis, based on mathematical laws of crystalization. Application to austenite-pearlite (speheroidite) transformation during rapid electric heating. Analysis of crystallization during heating at constant rate. Experimental study of hysteresis. Applicability of correlations derived to all crystallization reactions for which ratio of nucleation to growth rates is independent of temperature.

11856 Influence of Deformation Upon Kinetics of Martensite Transformation. O. P. Maksimova and A. I. Nikonorova. Henry Brutcher, Translation 2838, 6 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 81, Nov. 11, 1951, p. 183-186.

Previously abstracted from original.

11857 On the Intermediate Transformation of Austenite. R. I. Entin. Henry Brutcher, Translation 2839, 9 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 79, Aug. 21, 1951, p. 973-976.)

Previously abstracted from original.

11858 Gases in Pig Iron. V. Zednik. Henry Brutcher, Translation 2849, 8 pages. (From *Hutnicke Listy*, v. 5, Nov. 1950, p. 445-449; Dec. 1950, p. 485-492.)

Previously abstracted from original.

11859 On the Influence of the Quenching Temperature Upon the Quantity of Retained Austenite in Steel. V. D. Sadovskii and G. N. Bogacheva. Henry Brutcher, Translation 2885, 3 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 11, 1952, p. 221-222.)

Previously abstracted from original.

11860* Grain Growth Characteristics of Pure Zirconium. Nathan Davidson. University of Pennsylvania Master's Thesis, June 1951, 32 pages. (QD181.Z7 D28g.)

Isothermal grain-growth characteristics were investigated for a temperature between 500 and 700°C. in 50° increments using initial average grain diameters of 0.0068, 0.0048, and 0.0051 mm., respectively. Effects of time, temperature, and dispersion

of a second phase within the material were evaluated quantitatively. Micrographs.

See also:
11743 (vibration effects on solidification of weld metal)
11762 (diffusion of C and N into steels)
11818 (epsilon phase formation in Fe-Mn alloy)
12532 (diffusion in crystals)

12. METALS—PHYSICAL PROPERTIES AND TESTS

11861* The Heats of Combustion of Thorium and Uranium. Elmer J. Huber, Jr., Charles E. Holley, Jr., and E. H. Meierkord. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3406-3408.

Precise measurements of the heats of combustion of Th, U, and UO_2 were made and from the results, heats of formation of ThO_2, UO_2 and U_3O_8 were calculated.

11862 Heterogeneity of Metal Surfaces. M. Boudart. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3556-3561.

Some consequences of induction are pointed out in connection with problems in chemisorption and catalysis. In particular, the nature of "active centers" on a metal surface is elucidated. 39 ref.

11863* Hysteresis of Shaft Materials in Torsion. W. P. Welch and B. Cametti. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 753-763; disc., p. 763-764.

Elastic hysteresis tests were limited to those shaft materials that could be supplied in large diameters. Since solid shafts are usually employed in these applications, the tests were conducted on solid specimens, except for one tubular specimen included for the purpose of comparison. Materials tested were SAE 1015 and 4140, K Monel, and Inconel X. Graphs, photographs, tables, and diagrams. 11 ref.

11864* Behavior of Superheater Tubing Materials in Contact With Combustion Atmospheres at 1350°F. H. A. Blan, A. M. Hall, and J. H. Jackson. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 813-819.

Report on the field-test phase of experiments on the above, which were done at Battelle Memorial Institute, Columbus, Ohio. Materials tested were austenitic stainless steels, Ni-base alloys, and aluminized cold-rolled steel. Tables, diagrams, graphs, and photomicrographs. 11 ref.

11865* The Grain Boundary Energy, Its Measurements and Influence Upon the Properties of Metals and Alloys. T. B. Massalski. *Journal of the Birmingham Metallurgical Society*, v. 32, June 1952, p. 38-59.

Discusses some experimental and theoretical evidence referring to origins, variation, and action of the energy associated with various grain boundaries and surfaces. Discusses existing theories of the nature of the grain-boundary structure. Diagram and graphs. 27 ref.

11866* Influence of Added Elements and Condition of Graphite Upon Electrical Resistance of Cast Iron. Ichiro Iitaka and Kazuhiko Sekiguchi. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 23-25.

Results of experiments charted, tabulated, and discussed.

11867 Studies on Some Metal Electrodes. Part IX. The Temperature Coefficients of the Copper and Antimony Electrodes in Solutions Initially Free From Their Ions. The Mode of Oxidation of These Metals. A. Riad Tourky and E. M. Khairy. *Journal of the Chemical Society*, July 1952, p. 2626-2633.

Results are discussed in the light of the theory of lattice defects.

11868* Combustion of Aluminum in Air. (French.) René de Salins. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 16, 1952, p. 2437-2439.

Reports on combustion experiments with Al powder in air, by means of a stationary flame. Details of the experiments are indicated. Flame-spectra lines are tabulated and discussed.

11869* Charges in the Electrical Conductivity of Metals During Their Fusion. (French.) Geneviève Sutra. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 30, 1952, p. 2589-2591.

The above undergoes an abrupt change at the melting point. Contrary to present opinion, it is shown that this variation is definitely related to that of volume. Data for various metals are tabulated and charted.

11870 Solutions in Liquid Iron. Part 2. The Influence of Sulphur on the Solubility and Activity Coefficient of Carbon. J. A. Kitchener, J. O'M. Bockris, and D. A. Spratt. *Transactions of the Faraday Society*, v. 48, July 1952, p. 608-617.

The solubility of graphite in liquid iron was measured from 1200-1700°C. with addition of 0-1.4% S. Thermodynamic and structural significance of the results is discussed. Graphs and tables. 21 ref.

11871 Magnetostriction of Some Ferromagnetic Alloys. E. W. Lee. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 160-164.

A simple apparatus is described which comprises a double roller and mirror system and is capable of giving accurate measurements of magnetostriction of ferromagnetic rods. The apparatus was used to study the magnetostriction of some alloys, including the Ni-Co system. Temperature coefficients of magnetostriction of four Ni alloys were measured. Data are given for Co, 4 Ni-Fe alloys; 2 Ni-Si alloys; Monel; Mangonic; and 8 Ni-Co alloys. Apparatus diagram and graphs. 15 ref.

11872 The Thermodynamics of Substances of Interest in Iron and Steel Making. III. Sulphides. F. D. Richardson and J. H. E. Jeffes. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 165-175.

A survey is made of available data on thermodynamics of sulfides and of gaseous sulfur compounds of interest in iron and steel making. The results are plotted on free-energy/temperature diagrams, and equations and likely accuracies are quoted for each substance. 66 ref.

11873 The Electrical Resistance of Binary Metallic Mixtures. Rolf Landauer. *Journal of Applied Physics*, v. 23, July 1952, p. 779-784.

A theory for a random mixture is given, based on the assumption that each crystal acts as if surrounded by a homogeneous medium whose properties are those of the mixture. Comparisons with experiment are made. 18 ref.

11874* Melting of Cadmium. (German.) Lucie Apelt. *Metalloberfläche*, ser. B, v. 4, July 1952, p. B107-B108.

Presents vapor-pressure curve for Cd. Discusses significance of observations in comparison with other metals.

11875 The Metal Germanium and Its Use in the Electronics Industry. Anthony S. Rugare. *Metal Progress*, v. 62, Aug. 1952, p. 97-103.

Production, properties, and applications—mainly as a semiconductor, processing of Ge billets, "doping" with "donor" (As, Sb, P, or Bi) or "acceptor" (Al) materials, and heat treatment. Crystal and atomic structure and theory of semiconductors as applied to Ge are gone into quite thoroughly.

11876* Density Measurements on Molten Germanium and Tellurium. W. Klemm, H. Spitzer, W. Lingenberg, and H. J. Junker. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 3, 1952, p. 629-637.

Discusses the distinction between metals, "meta" metals, semiconductors, and nonmetals and shows that on the nonmetallic side of the metal-nonmetal boundary, there are especially large interstitial lattice spaces which always are reduced in volume upon melting, after expanding upon melting. The volume of Te contracts again when the melting process is completed. Tables, diagrams, graphs. 15 ref.

11877 Magnetic Properties, Internal Strains and the Bauschinger Effect in Metals. D. V. Wilson. *Nature*, v. 170, July 5, 1952, p. 30-31.

Diagram summarizes results showing that, in the case of a heat-treated 0.88%-C steel, change in indentation hardness which results from a moderate degree of deformation is de-

12. *Metals—Physical Properties and Tests*

pendent on microstructure. Up to a certain limit, with increasing initial hardness, magnitude of the softening effect increases progressively. At higher hardness values, observed softening is less, although initial internal strain energy continues to increase with hardness. Martensite tempered below about 140°C. does not show the softening effect. A possible explanation of these effects is discussed.

11878 Surface Oxide Films in Intermetallic Contacts. M. Cocks. *Nature*, v. 170, Aug. 2, 1952, p. 203-204.

Bowden and Hughes have shown that removal of surface oxide films can endow metals with very high coefficients of friction. To examine to what extent these films, when present, prevent metallic contact, electrical-resistance measurements were made on the loaded junction between crossed cylinders of various metals. Results are charted and discussed.

11879 Thermal and Electrical Conductivity of Porous Metals Made by Powder Metallurgy Methods. P. Grootenhuis, R. W. Powell, and R. P. Tye. *Proceedings of the Physical Society*, v. 65, sec. B, July 1, 1952, p. 502-511.

Measurements of thermal conductivity and electrical resistivity over the range of 20-200°C. are reported for several specimens of a sintered porous bronze material (89% Cu, 11% Sn). Suggestions are made for estimating the thermal conductivities of similar porous materials. Graphs. 21 ref.

11880 Heat Transport in Lead-Bismuth Alloys. J. L. Olsen. *Proceedings of the Physical Society*, v. 65, sec. A, July 1, 1952, p. 518-532.

Variation with temperature and with magnetic field of the heat conductivity of a series of Pb-Bi alloys was measured. Estimates were made from the experimental data of the processes contributing to the heat conductivity, and of resistances due to the various scattering mechanisms limiting these conductivities. Numerous graphs. 17 ref.

11881 Infra-Red Absorption by Metals at Low Temperatures. K. G. Ramanathan. *Proceedings of the Physical Society*, v. 65, sec. A, July 1, 1952, p. 532-540.

The infrared absorptivities of several electropolished metal surfaces were measured at liquid-He temperatures with a specially designed radiation cryostat with a black body at room temperature as the source and a differential He-gas thermometer as the detector. The absorptivities of the normal metals, which include a number of alloys, are compared with values calculated by various theories of metallic reflection. Diagrams and tables.

11882 A Note on the Theory of Conduction in Metals. E. H. Sondheimer. *Proceedings of the Physical Society*, v. 65, sec. A, July 1, 1952, p. 561-562.

Considers various theories on the above and points out cases where the conventional idea does not apply. Briefly treats implications of the new theory as applied to the properties of bismuth.

11883 The Thermal Conductivity of Metals at Low Temperatures. E. H. Sondheimer. *Proceedings of the Physical Society*, v. 65, sec. A, July 1, 1952, p. 562-564.

The theory of thermal conductivity is compared with experimental results reported by recent investigators.

11884* Properties of Metals Below —300°F. W. T. Ziegler. *Refrigerating Engineering*, v. 60, Aug. 1952, p. 848-852; disc. p. 852.

Reviews available information on mechanical properties; specific heat; thermal expansion; electrical conductivity; and thermal conductivity. Graphs and 25 ref.

11885 Measurement of the Thermal Accommodation Coefficients of Gases. A. E. J. Eggleton, F. C. Tompkins, and D. W. B. Wanford. *Proceedings of the Royal Society*, ser. A, v. 213, June 24, 1952, p. 266-273.

A study of the above, in part in relation to the chemisorption of gases on metals. Theoretical and experimental checks were made on the techniques of Roberts and Bremmer. Experimental values are given for neon at a tungsten surface. Apparatus diagrams and graphs.

11886 Navy Develops New Permanent Magnetic Material. *Steel*, v. 131, July 28, 1952, p. 76-77.

Describes an alloy of manganese bismuthide and unreacted Mn and Bi which is said to have the highest recorded coercive force of any known permanent-magnet material. Magnets are made by powder-metallurgy techniques. Illustrated.

11887* The Change of Conductivity of Metals in Strong Magnetic Fields. (English.) Yasaku Tanabe. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Feb. 1951, p. 91-106.

Change of resistance in a transverse magnetic field was studied in strong magnetic fields at room temperature. The metals studied were Te, Ce, Sb, Fe, C, Co, and Ni. It was found that there is a distinct difference in the change of resistance between ordinary and ferromagnetic metals. The difference was found to be caused by the fundamental difference in origin of the conduction electrons.

11888* On the Vibrational Spectrum and the Vibrational Specific Heat of a Binary Superlattice Alloy. (English.) Yoshio Shibuya, Youshüchi Fukuda, and Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 182-186.

Houston's approximate method of finding the frequency distribution function was applied to calculation of vibrational specific heat of β-brass in the state of any specified degree of order. It is shown that the vibrational specific heat of the disordered alloy is generally larger than that of the ordered one at ordinary temperatures.

11889* Behaviour of Molybdenum and Nickel and Some Molybdenum-Nickel-Alloys in Acid Electrolytes. (German.) Georg Masing and Günther Roth. *Werkstoffe und Korrosion*, v. 3, May-June 1952, p. 176-186; July 1952, p. 253-262.

Shows that potential of the Mo electrode depends on pH. This dependence is explained in analogy to Sb. In anodic dissolution, if current density is not too small, Mo follows the relation of Tafel. Divergences are explained. A method for indirect measurement of oxygen-depolarization of different metals is described. It permits absolute determination of dissolved O_2 in the electrolyte by electrochemical means. From the results, acid resistance of Mo and its alloys can be explained. Second part deals especially with Ni and Ni-Mo alloys, and with a method for measuring the role of oxygen in corrosion. 65 ref.

See also:

11667 (draw speed vs. electrical properties of stainless wire)
11715 (cu-impregnated Fe compacts)
11740 (electrical conductivity of Cu welds)
11784 (properties of electrodeposited Ni)
11816 (densities of Au-Ni alloys)
11851 (kinetics of age-hardening of Al-Ag alloys)
11896 (dimensional stability of Zn-base alloy)
11951 (Pb effect on expansion coefficient of Zn-Al-Cu alloys)
11962 (thermal conductivity of Ni and alloys)
12500 (free energy in ternary systems)
12817 (optical properties of thin metallic films)
12959 (atomic radiation effects on metals)

13. METALS—MECHANICAL PROPERTIES AND TESTS

11890* Aluminum-Zinc-Magnesium Alloys. (German.) P. Brenner. *Aluminium*, v. 28, July-Aug., 1952, p. 216-222.

Discusses improvements in yield and tensile strengths of the above, also in corrosion resistance. Effects of addition of Cu are described. Numerous graphs and tables show comparative properties of the various compositions. Includes effects of plating with different metals, and phase diagrams for the systems Al-Zn-Mg, Al-Si-Mg, and Al-Cu-Mg, all in the Al-rich regions. 23 ref.

11891* Recent Results on the Endurance of Riveted Joints in Aluminum Sheets. (German.) Hermann Bürnheim. *Aluminium*, v. 28, May 1952, p. 140-143; July-Aug. 1952, p. 222-229.

Graphs and tables show little variation among various Al and Mg alloys in dynamic strength properties. Second part describes

influence of design, layout, and riveting method on endurance of riveted joints.

11892* A Time-Temperature Relationship for Rupture and Creep Stresses. F. R. Larson and James Miller. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 765-771; disc., p. 771-774.

Above relationship was adapted and applied to existing data on several widely different ferrous and nonferrous alloys with good results. Methods are described by which short time tests can be used to determine long-time properties. Numerous tables and graphs. 15 ref.

11893* Effect of Temperature Variation on the Long-Time Rupture Strength of Steels. Ernest L. Robinson. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 777-780; disc., p. 780-781.

Presents a method of computing the factor of safety of a structural member with reference to a stated life, while operating under stress at high temperature when the temperature or stress varies moderately according to some definite pattern. Tables and graphs. Data for Timken 16-25-6 steel are presented.

11894* High-Temperature Stress-Rupture Testing of Tubular Specimens. L. F. Kooistra, R. U. Blaser, and J. T. Tucker, Jr. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 783-791; disc., p. 791-792.

Method was developed in which a tubular specimen under internal steam pressure and at a controlled temperature is tested in stress rupture. Test apparatus is described and a number of the test results for S49 steel; Croloys 3M, 9 and 12; and stainless steels 16-13-3, 18-8, 18-8 Cb ,and 18-8 Si are discussed in relation to similar data obtained on simple tension specimens. Graphs, tables, and photographs.

11895* Rupture and Creep Characteristics of Titanium-Stabilized Stainless Steel at 1100 to 1300°F. J. W. Freeman, G. F. Comstock, and A. E. White. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 793-801; disc., p. 801.

Rupture and creep strengths were established at 1100, 1200, and 1300°F. for 18-8 + Ti steel heat-treated at 1900 and 2050°F. Several Ti/C ratios were included as a variable. Results are discussed and tabulated. Graphs and photomicrographs.

11896* The Effect of Certain Metallic Impurities on the Properties of Zamak 3-Type Zinc-Base Die Casting Alloys. R. C. Bell, J. O. Edwards, and J. W. Meier. *Canadian Mining and Metallurgical Bulletin*, v. 45, July 1952, p. 404-412; disc., p. 412-413; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 262-270; disc., p. 270-271.

A study of the above covering effects of Pb, Cd, Sn, Cu, or In, or combinations, on mechanical properties and dimensional stability. Tests were made under varied conditions of temperature and aging. Apparatus diagram, tables, photographs, and graphs. 21 ref.

11897* On Wear Properties of Spheroidal Graphite Cast Iron. Fusao Hayama. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 20-22.

Wear-test apparatus is diagrammed. Results are tabulated, charted and discussed for 6 microstructural types of cast iron.

11898* Studies on the Ternary System of the Al-Si-Zn Casting Alloy. Shigeo Oya. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 46-47.

Ternary diagrams show tensile strength and Brinell hardness of Al-Si-Zn casting alloys, also effects of 0.5% Cr on these properties.

11899* The Research for the Fatigue of Mild Steel by Etching. Hiroshi Yamanouchi and Takeshi Inukai. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 63-64.

Study of the mechanism of fatigue-crack initiation. The specimens were etched to reveal the microstructure in the neighborhood of crack inception.

11900* Mechanical Tests With Micro-Test Specimens. (Spanish.) F. del Moral and M. Alvarez. *Ciencia y Técnica de la Soldadura*, v. 1, July-Aug. 1951, 8 pages.

Describes apparatus which makes it possible to carry out tensile fatigue, and shear tests on very small test pieces. This machine produces a photographic diagram of strengths and deformations, from which can be deduced all of the characteristics of the material under study. Includes photographs.

11901* Photoelastic Study of Fracture During Pure Bending. (French.) Félix Zandman. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 9, 1952, p. 2337-2339.

Describes and illustrates the above made on a sample of methyl methacrylate. The photographs show the origin of the fracture and its mode of propagation.

11902* Stress-Probing: A Rapid Method for Stress-Surveying. Nicol Gross and P. H. R. Lane. *Engineering*, v. 174, July 25, 1952, p. 97-100.

Describes and illustrates new method for measurement of stresses in pressure vessels which is much cheaper and less time consuming than the strain-gage method, yet gives results in good agreement with the latter. A commercially produced measuring gage, based on change of helix angle of a perforated twisted strip, is used. Comparative results are charted.

11903* A New Micro-Bending Test Method. N. Mironoff. *Engineers' Digest*, v. 13, July 1952, p. 210-211. (Translated and condensed from *Revue de la Soudure*, v. 7, no. 4, 1951, p. 214-232.)

Previously abstracted from original.

11904* Roller-Bearing Problems. (German.) VDI-Forschungsheft 434, 1952. (Supplement to *Forschung auf dem Gebiete des Ingenieurwesens*, v. 18, sec. B, 1952), 28 pages.

Contains two papers: "The Plastic Behavior of Rotating Steel Rollers Having Point Contact", G. Niemann and K. W. Kraupner; and "Oscillations in Ball and Roller Bearings Having Statically Fixed Supports", Hans Perret.

11905 The Effect of Zirconium on the Properties and Structure of Superduralumin, With Particular Reference to Forgings. M. Tournaire and M. Renouard. *Journal of the Institute of Metals*, v. 80, July 1952, p. 593-597.

Superduralumin A-U4 GI (Duralumin FR) is frequently used in France for high-strength forgings. However, these forgings, particularly those of large size, are susceptible to quenching cracks and in addition, like forgings of ordinary Duralumin, they show considerable variations in grain-size in different parts of the same section. It was found that if the Mn content of the alloy is replaced wholly or partly, by 0.25% Zr, forgings are obtained whose mechanical properties are in no way inferior but which have a fine and uniform grain size. The new alloy can also be cast, by a semicontinuous method, into very large billets with less risk of fissures than with ordinary Superduralumin, and it can be forged with greater ease.

11906 Sixth Hatfield Memorial Lecture: The Flow of Metals. E. N. da C. Andrade. *Journal of the Iron and Steel Institute*, v. 171, July 1952, p. 217-228.

Comprehensive discussion of the above, emphasizing constant stress test methods. Data for various metals are charted and dscussed. 19 ref.

11907 The Creep of Zinc Single Crystals. L. Slifkin and W. Kauzman. *Journal of Applied Physics*, v. 23, July 1952, p. 746-753.

Transient creep of single crystals prepared from 99.999% Zn was studied at 35°C. and at strain rates of the order of 10^{-5}/min. Results are discussed in relation to the findings of other workers and are interpreted in terms of recent models of the metallic state. 27 ref.

11908 Improvements in Chromium-Molybdenum Steel Resistant to Elevated Temperatures. (French.) O. L. Bihet and A. Gourlez de la Motte. *L'Ossature Métallique*, v. 17, June 1952, p. 327-331.

Gives details of experiments on addition of V to increase the hardness of Cr-Mo steel containing 0.5-0.7% Cr and 0.4-0.5% Mo. Investigation with the electron microscope is outlined; results are interpreted. Graphs and micrographs.

11909 Reversed-Bending Fatigue Tests on Cable-Sheaths. C. J. Thwaites. *Metal Industry*, v. 81, July 18, 1952, p. 50.

Since the lead normally produced by Broken Hill, Rhodesia, contains approximately 0.02% Ag, an amount which is in-

13. *Metals—Mechanical Properties and Tests*

sufficient for economic recovery, and since this lead will be used in South Africa and probably in other parts of the Commonwealth as a basic material for cable sheathing, it was desired to ascertain the effect of this silver content on fatigue properties of the lead and alloys made therefrom. Test procedure is described. Results of investigation are tabulated and charted.

11910* Hardness Measurements on Electrodeposited Layers. (German.) Albert Keil and Otto Wüst. *Metalloberfläche*, ser. A, v. 6, July 1952, p. A102-A106.

Describes various apparatus and methods for the above. Sources of errors are indicated. Micrographs.

11911 Distortion and Service Tests of Carburized Gears Made of Boron Steels. (Continued.) S. L. Widrig and Wilson T. Groves. *Metal Progress*, v. 62, July 1952, p. 75-78.

Describes results of a test program, with information given on heat treatments; on fatigue and chipping tests. Deals with 80B17, 80B20, 8620, 8123, and 94B17 steels. Table and graphs.

11912 Proof Testing of Full Sized Automobile Components. A. L. Boegehold. *Metal Progress*, v. 62, Aug. 1952, p. 82-86.

Describes fatigue-testing equipment and procedures of Research Laboratories Div., General Motors Corp. Illustrated.

11913 Embrittlement in Plated Steel. John J. Dale. *Metal Progress*, v. 62, Aug. 1952, p. 95-96.

Two examples of damage done to steel parts by hydrogen generated during electroplating operations. In each instance the defects show marked directionality. Illustrated.

11914 Theories of the Fracture of Metals. (French.) P. Laurent. *Métaux: Corrosion—Industries*, v. 27, May 1952, p. 189-200.

Reviews the above on the basis of the literature. Discusses separately the fracture of monocrystals and polycrystals. Graphs. 14 ref.

11915* Conditions for the Occurrence of Fractures During Creep Tests. (French.) Georges Vida. *Métaux: Corrosion—Industries*, v. 27, May 1952, p. 201-215.

Reviews the above on the basis of the literature. Discusses in particular causes for acceleration of creep and of fracture; and influence of various factors on type of creep fracture, and upon the time required for fracture, and for extension of the fracture. Graphs, micrographs, and 22 ref.

11916* Mechanical Properties of Solids as a Function of Temperature. (French.) (Plasticity, Viscosity, and Internal Friction.) Paul Le Rolland. *Métaux: Corrosion—Industries*, v. 27, May 1952, p. 216-232.

Discusses the above on the basis of the literature. Treats in particular the perfect crystal at absolute zero, thermal agitation, the imperfect crystal, the migration of atoms, hardening, and the role of internal stresses. 11 ref.

11917 Effect of Strain-Temperature History on the Flow and Fracture of Ingot Iron at Low Temperatures. Glenn W. Geil and Nesbit L. Carwile. *Journal of Research of the National Bureau of Standards*, v. 48, June 1952, p. 399-406.

A study was made to determine the above effect on true stress-strain relationship for specimens extended in tension at −196° to 100°C. Tables and graphs. 12 ref.

11918 Photo-Elastic Determination of Boundary Stresses. William Shelson. *Nature*, v. 170, July 12, 1952, p. 82-83.

Describes improved method and apparatus for above determination.

11919 Mechanical Properties of Thin Films of Silver. J. W. Beams, W. E. Walker, and H. S. Morton, Jr. *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 524-525.

In the experiments described, films of silver of uniform thickness were electrodeposited on small cylindrical steel rotors with rounded ends and the rotational speeds required to throw them off of the rotors were measured. The rotors were spun in high vacuum. Tensile strength determined in this way is charted as a function of thickness.

11920 Allowable Design Loads for Aluminum Columns. Martin A. Rubinstein. *Product Engineering*, v. 23, Aug. 1952, p. 197, 199, 201.

Nomograms, their mathematical development, and illustrative examples.

11921* Impact Compression of Short and Long Column. Yuji Matsuura. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 62.

Results of experiments on square brass columns, compressed by a drop hammer. Graphs.

11922* Theory of Mechanical Wear. J. F. Archard. *Research*, v. 5, Aug. 1952, p. 395-396.

Briefly discusses the above.

11923* The Effect of Premature Manipulation of Ingots on the Quality of Rails. (French.) J. G. Platon. *Revue de Métallurgie*, v. 49, June 1952, p. 436-438; disc., p. 438.

Describes results of such handling, such as internal cracks, during customary factory procedure. Makes suggestions for improving the process.

11924 Slip Planes and the Energy of Dislocations. B. Chalmers and Ursula M. Martius. *Proceedings of the Royal Society*, ser. A, v. 213, June 24, 1952, p. 175-185.

Shows that the characteristic slip directions and planes in metal crystals can be explained and predicted by taking into account the dependence of the energy of a dislocation on its plane. The reason for the existence of alternative slip systems, particularly at high temperatures, is also discussed. Tables and diagram. 29 ref.

11925 The Creep of Metals Under Interrupted Stressing. A. J. Kennedy. *Proceedings of the Royal Society*, ser. A, v. 213, July 22, 1952, p. 492-506.

The creep behavior of polycrystalline Pb subjected to interrupted stress, or stress pulses, was examined with an apparatus which enables the creep curve to be recorded as a magnified photographic trace. When the metal is reloaded after an interruption, a new creep transient is exhibited which can be adequately expressed by assuming a fraction n of the material to have recovered its original Andrade β-flow properties, while the remaining fraction continues to deform as if unloading had not occurred. It is shown that this analysis is valid whether the material exhibits a finite Andrade k-flow or not. Variation of n with the time of creep previous to interruption, for a constant recovery time (R), and variation of n with R for a constant time were each investigated. 18 ref.

11926* Test Bar Design Influences Results on Investment Castings. R. J. Wilcox. *SAE Journal*, v. 60, July 1952, p. 32-36.

The above is discussed in detail. Test results are tabulated for cast-to-size and machined-to-size carbon and alloy-steel bars. Results show marked effect of design, which complicates establishment of a standard classification of investment castings according to mechanical properties.

11927 Bhn/E X 10^6=Modell=Measure of Wear Resistance. SAE Journal, v. 60, Aug. 1952, p. 42-45; disc., p. 45-46. (Excerpts from "Hardness, Elastic Modulus, and Wear of Metals", by T. L. Oberle.)

Ratio of Brinell hardness to elastic modulus, multiplied by 10^6 is designated "modell". Modell values for various materials are tabulated and discussed.

11928 A Researcher's Casebook on Magnesium Truck Wheels. *SAE Journal*, v. 60, Aug. 1952, p. 61-66. (Excerpts from "Magnesium Alloy Truck Wheels Evaluated Analytically", by Marvin H. Polzin.)

Results of investigation of bending strength, endurance limit, fatigue strength, stress-strain properties, as compared with Al and steel. Effects of design factors.

11929 Effect of Chemistry and Section Size on Properties of Ductile Iron. D. J. Reese, F. B. Rote, and G. A. Conger. *SAE Quarterly Transactions*, v. 6, July 1952, p. 385-394.

Presents the results of investigations conducted at the University of Michigan under the sponsorship of International Nickel Co., to determine influence of C, Si, and P contents and of section size on the mechanical properties of ductile cast iron. Numerous tables, graphs and photomicrographs.

11930 Hardness, Elastic Modulus, Wear of Metals. T. L. Oberle. *SAE Quarterly Transactions*, v. 6, July 1952, p. 511-515; disc., p. 516-517.

Proposes a new concept of wear and elastic limit of strain as a practical measure of these properties. Introduces the term "modell", which is defined as Brinell hardness multiplied by 10^6 and divided by elastic modulus. This unit gives an indication of the depth of penetration that a metal can tolerate without exceeding its elastic limit. Graphs and tables. Gives data for a wide variety of ferrous and nonferrous metals and alloys. 11 ref.

11931 Some Phenomena of Engine Wear as Revealed by Radioactive Tracer Technique. H. R. Jackson, F. C. Burk, L. J. Test, and A. T. Cowell. *SAE Quarterly Transactions*, v. 6, July 1952, p. 518-524, disc., p. 524-530.

Discussion is classified under 3 broad divisions: the effect of operating conditions, lubrication, and fuel on engine wear. Graphs and photographs.

11932 Round Work Correction for Rockwell Hardness. Louis Small and Keith Symon. *Tool Engineer*, v. 29, Aug. 1952, p. 41-45.

Analyzes errors involved in the Rockwell testing of round work so that a correction chart can be developed for use with Rockwell hardness specifications.

11933* Transition From Ductile to Brittle Behavior in Pressure Vessel Steels. T. N. Armstrong, N. A. Kahn, and Helmut Thielsch. *Welding Journal*, v. 31, Aug. 1952, p. 371s-380s.

Discusses nature of brittle behavior, evaluation of brittle behavior of steels, effects of temperature, transition temperature, effects of notches and notch sensitivity, test methods, code-test requirements, significance of test data, ductility and fracture transition, factors determining transition temperatures, metallurgical factors, mechanical factors, and fields for further study.

11934* The Behavior of Metallic Materials at Low and High Temperatures. (German.) W. Ruttmann and M. Werner. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, July 11, 1952, p. 673-682.

Reviews the above on the basis of the literature. Proposes the plotting of time-resistance diagrams for materials showing mechanical properties which are dependent upon temperature and time. Data are tabulated and charted for a wide variety of ferrous and nonferrous metals. 33 ref.

11935* Age-Hardening of Aluminum-Silver Alloys. I. Measurement of Hardness and the Limit of Elasticity. Werner Koster and Franz Braumann. **II. Measurement of Electric Conductivity and Thermoelectric Force.** Werner Koster, Horst Steinert, and Johannes Scherb. *Zeitschrift fur Metallkunde*, v. 43, June 1952, p. 193-207.

Part I discusses the above for 6, 10, 20, and 38% Ag. The establishment of a metastable balance in cold hardening is indicated. The influence of quenching stresses on the kinetics of age-hardening and its retrogression are described. Part II shows the effect of time on electric conductivity and thermoelectric force of an alloy containing 38% Ag. Data are tabulated and charted. 40 ref.

Miscellaneous Publications

11936 Plasticity of Steel and Quality of Surface Finish. F. P. Rybalko and M. V. Yakutovich. Henry Brutcher, Translation 2788, 5 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 64, Feb. 11, 1949, p. 673-674.)

Previously abstracted from original.

11937 Creep Tests on Molybdenum, Chrome-Molybdenum, and Chrome-Molybdenum-Vanadium Steels. E. Theis. Henry Brutcher, Translation 2882, 15 pages. (From *Stahl und Eisen*, v. 71, June 7, 1951, p. 619-624.)

Previously abstracted from original.

11938 Changes of the Modulus of Elasticity During Torsion. N. N. Davidenkov, I. S. Zhakovskaya, and V. A. Zhuravlev. Henry Brutcher, Translation 2893, 13 pages. (From *Zhurnal Tekhnicheskoi Fiziki*, v. 20, May 1950, p. 534-542.)

Experimental study on cylindrical specimens of low-carbon steel, brass, and duralumin when twisted through different angles, with and without subsequent tempering at different temperatures. Correlation between progressive cold working by torsion and variation of modulus. Effect of intermediate aging treatments. Influence of untwisting subsequent to twisting. Effects of tempering.

11939 Plastic Stress-Strain Relations for Combined Tension and Compression. Joseph Martin and H. A. B. Wiseman. National Advisory Committee for Aeronautics, Technical Note 2737, July 1952, 61 pages. (TL570 Un3t)

Plastic stress-strain for biaxial tension-compression principal stresses were determined for a 14S-T4 Al alloy. Constant-stress-ratio tests provided control data and information on influence of biaxial stresses on yield strength of the material. Variable-stress-ratio tests were made to determine whether the deformation or flow theory agrees better with actual plastic stress-strain relations and special tests were conducted to check the validity of various assumptions made in these theories. Data on shear are also given. Tables, diagrams, and numerous graphs.

11940 Influence of Chemical Composition on Rupture Test Properties at 1500°F of Forged Chromium-Cobalt-Nickel-Iron Base Alloys. J. W. Freeman, J. F. Ewing, and A. E. White. National Advisory Committee for Aeronautics, Technical Note 2745, July 1952, 69 pages. (TL570 Un3t)

62 alloys involving systematic individual variations of 10 elements present in a forged Cr-Co-Ni-Fe base alloy in the solution-treated and aged condition and simultaneous variation of Mo, W, and Cb were rupture-tested at 1500°F. It was found that the elements can be varied individually between quite wide limits without significantly changing the rupture properties. Includes data on creep rate, and discussion of possible mechanism. Photomicrographs, tables, and graphs.

11941 Preview of Behavior of Grain Boundaries in Creep of Aluminum Bicrystals. F. N. Rhines and A. W. Cochardt. National Advisory Committee for Aeronautics, Technical Note 2746, July 1952, 40 pages. (TL570 Un3t)

Gliding of Al bicrystals along their mutual boundary was studied during creep tests at 200 to 650°C. and 1 to 100 psi. Photomicrographs, diagrams, graphs, and Laue patterns. 10 ref.

11942 X-Ray Stress Measurements. C. W. Tucker, Jr., and H. V. Anderson. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 67-74. (TG265 So13p)

Surveys methods, theory, and technique. Typical data for various metals and fabrication processes are charted and discussed.

11943 A Study of Fatigue in Metals by Means of X-Ray Strain Measurement. John A. Bennett. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 105-112. (TG265 So13p)

The above study was made on SAE-4130 steel. Apparatus, technique, and results are thoroughly described.

11944 Techniques in Residual Stress Analysis. Walter Leaf. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 133-140. (TG265 So13p)

In determination of residual stress by the sectioning method, the metal must be removed in such a manner that no appreciable residual stress is created at the fresh surface. Presents various methods of metal removal which the author has found satisfactory during several years of analysis, and also gives details of measuring and calculating techniques.

11945 A Three Dimensional Photoelastic Stress Analysis of a Threaded Drill Pipe Joint. W. F. Franz. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 185-194. (TG265 So13p)

Fundamental theory method of machining models, and testing technique are fully covered. Two test specimens were made and tested. Results show good agreement when compared with those of actual fatigue tests on steel test specimens.

11946 Quantitative Evaluation of Residual Stresses by the Stresscoat Drilling Technique. A. G. Tokarcik and M. H. Polzin. *Proceedings of the Society for Experimental Stress Analysis*, v. 9. no. 2, 1952, p. 195-207. (TG265 So13p)

The Stresscoat drilling technique with dye-etchant sensitizer for measuring residual stresses was applied to a Mg casting. Rather

13. *Metals—Mechanical Properties and Tests*

large radial crack patterns of uniform size were obtained regardless of the area investigated. The dissection method, consisting of mechanically isolating a small piece with a jeweler's saw, etching off the cold worked layer, and reading the relaxation by strain gages as described by Found, was then applied to the same casting. The results showed negligible residual stresses of a compressive nature. Therefore, the Stresscoat method was investigated further in an attempt to explain the discrepancy in Mg and also to extend the work to Al and steel. Results are charted, illustrated, and discussed.

Books

11947 Residual Stress Measurements. 210 pages. 1952. American Society for Metals, Cleveland. (TA460 Am35r)

4 educational lectures presented during the 33rd National Metal Congress and Exposition, Detroit, Oct. 15-19, 1951.

See also:

11611 (hardenability of arc-furnace boron steels)
11667 (draw speed vs. tensile strength of stainless wire)
11669 (deformation stresses on drawing of rod)
11705 (toolsteels and standard steels for twist drills)
11715 (Cu-impregnated Fe compacts)
11717 (properties of stainless-steel powders)
11722 (light alloy welds)
11725 (mechanical properties of armor-plate welds)
11739 (brazed stainless-steel joints)
11740 (Cu and Cu welds)
11743 (vibration effects on properties of weld metal)
11749 (mechanical properties of heat-resistant steel)
11755 (softening treatment vs. hardness of stainless)
11756 (hardness and tensile strength of Meehanite)
11762 (carburized and cyanided steels)
11784 (properties of electrodeposited Ni)
11808 (spheroidal graphite cast iron)
11817 (microtensile-test equipment)
11825 (high-temperature creep strength of Cr-Mo steel)
11847 (high-purity aluminium)
11877 (internal strains and Bauschinger effect in metals)
11884 (very-low-temperature mechanical properties)
11948 (physical properties of superstrength alloys for high-temperature service)
11949 (endurance limit of welded and unwelded steels)
11951 (Pb effect on impact strength of Zn-Al-Cu alloys)
11953 (mechanical properties of Hastelloy B)
11962 (mechanical properties of Ni and alloys)
11977 (annealing and corrosion effects on galvanized steel)
12140 (testing cemented carbides)
12187 (strain-gage analysis of foundation structure)
12202 (mechanical properties of Ti)
12298 (gas-turbine-blade failures)
12377 (frictional properties of clutch materials)
12386 (mechanical properties of bevel gears)
12388 (elastic behavior of steel H-beams columns)
12395 (structural data for steel and Al)
12532 (properties of crystals)
12623 (photoelastic stress analysis—plastics for)
12729 (theory of stationary dislocations)
12788b (theory of plasticity)

14. CORROSION

11948* Experimental Superheater for Steam at 2000 Psi and 1250°F—Progress of Field Operations. F. G. Ely and F. Eberle. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 803-812; disc., p. 812.

To investigate the properties of new superstrength alloys for high-temperature steam superheater service, a test element constructed of 2-in o.d. alloy tubes was installed in an operating boiler at Twin Branch Plant and supplied with steam at 2000 psig. and 950°F., which was heated at 1250°F. Operating conditions, and results of the first 5000 service hrs., are described. Croloy 2¼, types 304, 316, 318, 321, and 347 stainless steels, Timken 16-25-6, and Armco 17-14 Cu-Mo were tested. Internal surface conditions and microstructures of the tubes after test were examined. Illustrated.

11949* Endurance Limit of Welded and Unwelded Steel Specimens With and Without Influence of Corrosion. (German.) Clemens Appaly and Franz Bollenrath. *Brennstoff-Wärme-Kraft*, v. 4, July 1952, p. 223-227.

Reports on experiments on low-alloy Mn and Cr-Mn steels, with and without exposure to aqueous corrosion. Experimental details are indicated; results tabulated and charted.

11950* Acids- and Heat-Resisting Properties of Nodular Cast Iron. Ichiro Iitaka and Kazuhiko Sekiguchi. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 17-19.

Results for acidic and aqueous corrosion and high-temperature oxidation of nodular cast iron, ordinary cast iron, and mild steel are charted and discussed.

11951* Influence of Lead to Zamak Alloys for Die Casting. Nobutaro Kayama and Masakazu Ichida. *Reports of the Casting Research Laboratory*, no. 3, 1952, p. 48-51.

Effects on aqueous corrosion resistance, thermal expansion coefficient, and impact strength of Zn-Al-Cu alloys containing 0.005-0.04% Pb. Tables and graphs.

11952 Cathodic Engineering Preview. T. E. Nicholas. *Chemical Engineering*, v. 59, July 1952, p. 220-221.

Principles of cathodic protection for chemical reaction vessels, piping, heat exhangers, etc.

11953 Hastelloy Alloy B. Edward D. Weisert. *Chemical Engineering*, v. 59, July 1952, p. 314, 316, 318, 320, 322, 324, 326, 328.

Gives in chart-form the corrosion resistance of this Ni-Mo alloy to 190 corrosives. Includes data on mechanical properties, applications, and forms available.

11954* Preserving What You Have: From the Corrosion Engineer's Viewpoint. E. A. Tice. *Chemical Engineering Progress* (Engineering Section), v. 48, July 1952, p. 329-332.

Discusses effects of aeration or presence of oxidizing agents; velocity of media flow or agitation effects; and temperature. Data for stainless steels, high-Ni alloys, cupronickels, and Zn are charted and discussed.

11955* Corrosion in CO_2-H_2S-Amine System. E. C. Carlson, G. R. Davis, and K. L. Hujsak. *Chemical Engineering Progress* (Engineering Section), v. 48, July 1952, p. 333-335; disc., p. 335-336.

The increased utilization of natural gas from our gas areas has multiplied the number of plants using amine systems for gas sweetening. In some cases, severe corrosion problems have been encountered. In one plant, corrosion of the carbon-steel tubes in the reboiler was so rapid that failure occurred in 2-3 mos. Operating conditions of this system were simulated on a pilot scale. It was found that the metal attack could be reduced when the amine contained small residual amounts of both CO_2 and H_2S and the heat medium oil was 500°F. Reduction of the oil temperature to 370°F. practically eliminated corrosion in the pilot unit.

11956* Recent Views on the Relationship Between Electrochemical and Chemical Corrosion. (German.) A. Bukowiecki. *Chimia*, v. 6, July 15, 1952, p. 156-165.

Experiments show that a metal may be attacked simultaneously by electrochemical and purely chemical corrosion regardless whether the liquid in contact with the metal is a poor or a good conductor of electricity. Diagrams, graphs, and tables. 38 ref.

11957 Corrosion Resisting Characteristics of Iron Modified 90:10 Cupro Nickel Alloy. W. C. Stewart and F. L. LaQue. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 259-277.

Summary of information, particularly where resistance to attack by salt water is required. Information is included on the influence of iron content and heat treatment. Behavior of the alloy under several conditions of exposure to attack by sea water is described. Some experiences in sulfide-polluted water and in other corrosive media are described. Numerous tables, graphs, and illustrations.

11958 Why Power Companies Should Promote Corrosion Control. H. H. Anderson. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 278-282.

Engineering methods of minimizing corrosion damage are reviewed, with frequent examples of the varying corrosion prob-

lems found among utilities. Discusses various kinds of corrosion and methods used to combat it in electric power, steam generating, and other utility plants. 25 ref.

11959 Corrosion by Fluorine and Fluorine Compounds. Ralph Landau. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 283-288.

Materials of construction useful in handling fluorine are given, with indications of their limitations. Specific recommendations on general design factors are itemized. General characteristics of the fluorocarbons, and of some specific fluorocarbon materials, are described.

11960 Some Corrosion Experiences With Aluminum Crude Oil Lines. Almont Ellis. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 289-291.

Experiences with 63S-T6 extruded Al pipe indicates that efficiency of the inert-gas arc-welded joint is not very high. Failure in a little more than 25 mos. as the result of pitting at annealed areas occurred. External corrosion at water crossings was observed in the form of 1/16-in. pits after 16 mos. Another line showed no evidence of external corrosion after 3½ yrs., although partly submerged in salt water.

11961 Sour Oil Well Corrosion. TP-1D. Sour Oil Well Corrosion. J. A. Caldwell. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 292-294.

Technical Subcommittee Report. A preliminary survey of the extent of the problem was made in Arkansas, Kansas, and West Texas-New Mexico areas. 8,125 sour-crude wells were reported; of this number about 44% were economically affected by corrosion. Costs ranged from $270 per well per year in the West Texas-New Mexico area to $2000 in the Kansas area. Substantial reduction in cost was effected in some cases by application of various remedial measures.

11962* Technical Facts for Food Processors on Nickel and High-Nickel Alloys. Part I. Corrosion Fundamentals and Specific Data on Tomato Units. *Food Engineering*, v. 24, Aug. 1952, p. 79-81, 218, 220-221.

Describes compositions, mechanical properties, heat-transfer rates, and corrosion resistance to tomato products of the above. Data are tabulated. (To be concluded.)

11963 Corrosion Control in Water Systems. Herbert H. Uhlig. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1736-1740.

General coverage of corrosion by water in waterworks and boiler operations. Considers cathodic production, protective paints, organic coatings, metallic coatings, various "inhibitors," and the use of corrosion-resistant metals and alloys. 18 ref.

11964 Cooling Water Problems in the New York Metropolitan Area. Sidney Sussman. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1740-1744.

Tells how water treatment utilizing alkali for pH control and chromates for passivating film formation gives the most effective corrosion control in recirculating cooling-water systems. Also discusses control in once-through cooling-water systems. Tables and photographs.

11965 Effects of Velocity on Corrosion by Water. H. R. Copson. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1745-1752.

A general review of the above was undertaken with emphasis on Fe, Zn, Cu, and their alloys. Pertinent unpublished data are included. Graphs, photographs, and tables. 56 ref.

11966 Effect of Temperature on Corrosion of Metals by Water. Norman Hackerman. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1752-1755.

The influence of systematic temperatures and of temperature gradients on rates and distribution of corrosion reactions is considered. Some of the important temperature-dependent properties discussed are oxygen solubility, galvanic potentials, and precipitation rates. Various ferrous, nonferrous, and coupled metals are considered in this stiudy. 21 ref.

11967 Corrosion Control With Organic Inhibitors. J. N. Breston. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1755-1761.

Outlines the mechanism, properties, and conditions of application of organic inhibitors, and indicates their application in acid cleaning solutions, cooling and refrigerating systems, steam-generating systems, oil wells, and other petroleum production and handling systems. Graphs. 57 ref.

11968 Inhibitors for Eliminating Corrosion in Steam and Condensate Lines. R. C. Ulmer and J. W. Wood. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1761-1765.

Discusses 2 types of treatments advocated to control corrosion in the above: introduction of alkaline substances to neutralize the acidity and introduction of film-forming materials to coat the metal. Test data were obtained in 600-psi. boiler condensate with representative materials of both types. With Cu and brass, both types gave good results. Graphs, tables, and diagrams. 22 ref.

11969 Action of Sodium Silicate as a Corrosion Inhibitor in Water Piping. Leo Lehrman and Henry L. Shuldener. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1765-1769.

Results of anticorrosion treatment of water supplies of several hundred buildings in a number of different cities, during the past 25 yrs., are discussed. Economical and efficient corrosion controls are considered together with theories of their mechanisms. Tables and graphs. 24 ref.

11970 Protection of Metals Against Pitting Tuberculation and General Corrosion. Combined Phosphate-Chromate Treatment. H. Lewis Kahler and Philip J. Gaughan. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1770-1774.

Covers the history of the use of the chromate inhibitor and points out that chromate, although one of the best treatments for saving steel, gives pitting and tuberculation when used in concentrations insufficient to stop total attack. Field data from plants now using the combination treatment are presented and show that the laboratory research data is verified in extensive plant practice. Graphs and tables.

11971 Protective Film Formation With Phosphate Glasses. G. B. Hatch. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1775-1780.

Discusses the chemical reaction involved in the inhibition of galvanic corrosion of steel coupled to cathodic metals by the glassy phosphates. Tables and graphs. 13 ref.

11972 Inhibition of Galvanic Attack of Steel With Phosphate Glass. G. B. Hatch. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1780-1786.

Shows that the effect of a number of factors commonly encountered in parctice on the inhibition of the galvanic corrosion of steel coupled to copper with a glassy phosphate is quite similar to their effect on inhibition of the attack of steel alone. Numerous graphs.

11973 Cathodic Protection of Steel in Contact With Water. Leon P. Sudrabin and Henry C. Marks. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1786-1791.

Discusses the protective current requirements for the above and the reactions involved. Tables, graphs, and photographs. 30 ref.

11974 Pitting Corrosion Characteristics of Aluminum; Influence of Magnesium and Manganese. P. M. Aziz and Hugh P. Godard. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1791-1795.

This work was undertaken to determine the influence of alloying Mg and Mn with Al upon its pitting probability and pitting rate. Al in the purity range 99.5-99.99% was investigated using additions of 1.0% Mg, 1.25% Mn, and 0.5% Mg+0.5% Mn. Tables, graphs, and photographs.

11975 Corrosion Resistance of Titanium, Zirconium, and Stainless Steel. Lex B. Golden, I. Roy Lane, Jr., and Walter L. Acherman. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1930-1939.

Above was studied in mineral acids and inorganic chlorides. Ti, Zr, and a 20-29 Cr-Ni stainless steel show excellent resistance to all concentrations of NHO_3. In mixed-acid solutions, both Ti and stainless have better corrosion resistance than Zr. Of the 3 materials, only Zr is fully resistant to corrosion and stainless steels, are severly attacked. Heavy-metal chloride solutions have negligible effect on Ti, while stainless steel is

14. *Corrosion*

badly pitted and perforated. Zr is embrittled by ferric and cupric chloride solutions but unaffected by mercuric chloride. Ti and Zr are fully resistant to solutions of alkali and alkaline-earth chlorides, while stainless steel is susceptible to pitting in these media. Ti is entirely unaffected by hypochlorite solutions, Zr is slightly embrittled, and stainless steel is badly pitted. Tables, graphs, and photographs.

11976 Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 87A-88A, 90A.

Describes and illustrates results of experiments which show that stainless steels with low carbon content take a longer time at sensitizing temperatures to develop knife-line attack, or intergranular corrosion, during welding.

11977 Effect of Annealing on the Resistance of Galvanized Steel to Atmospheric Corrosion. S. E. Hadden. *Journal of the Iron and Steel Institute*, v. 171, June 1952, p. 121-127.

A study of the above dealing with a variety of aspects including: exposure tests of galvanized-steel wire and sheets, as-received and annealed for various times at different temperatures; effect of annealing on structure, composition, and mechanical properties of galvanized-steel wire; and mechanical strength of wires after test. Tables, graphs, and photomicrographs.

11978 Second Report of the Methods of Testing (Corrosion) Sub-Committee. *Journal of the Iron and Steel Institute*, v. 171, July 1952, p. 255-272.

A series of corrosion tests was carried out in a number of laboratories. Results of these tests are covered in detail. Includes discussion of a new laboratory test, developed by the Chemical Research Laboratory. Interim result for 5 yrs.' exposure are presented for the original field test. In an appendix, preliminary suggestions are made for the removal of corrosion products from mild-steel specimens carrying protective metallic coatings, with or without paint. Numerous tables and illustrations.

11979 Fretting Corrosion. R. S. Barnett. *Lubrication Engineering*, v. 8, Aug. 1952, p. 186-188, 205-206.

Discusses the above, citing examples. Considers detection, mechanism, effects of various factors, cooperative work on the problem, and mitigation. 14 ref.

11980 Corrosion of Copper Alloys. E. Börje Bergsman. *Metal Industry*, v. 81, July 18, 1952, p. 52-53.

Records some examples of corrosion attack, classified under 4 headings—tarnishing and oxidation, galvanic corrosion, stress corrosion (season cracking), and dezincification.

11981* Pitting of Aluminum in a Heavy-Water Reactor. *Nucleonics*, v. 10, July 1952, p. 19.

The fuel rods in the heavy-water reactor at Kjeller, Norway, consist of uranium slugs stacked inside aluminum tubes with 2-mm. walls. As shown in photographs, pitting and corrosion have affected the outer surface of these tubes where they were immersed in the heavy-water moderator.

11982* Gas-Condensate Well Corrosion. What It Costs and How to Combat It. T. S. Zajac. *Oil and Gas Journal*, v. 51, Aug. 11, 1952, p. 108, 110, 112.

Summary of what is being learned about this costly problem—what causes it, how to detect and evaluate it, and techniques and measures for controlling it.

11983 Metals and Coatings to Combat Corrosion. H. F. McConomy and J. J. Hur. *Petroleum Engineer*, v. 24, 1952, p. C28, C30.

Heavier-gage steel, Al, galvanized steel, organic resin-base coatings, and bituminous-base coatings are considered for steel refinery tanks.

11984* Air Brake Corrosion Problems. C. E. Macfarlane. *Railway Mechanical and Electrical Engineer*, v. 126, July 1952, p. 72-76.

Discusses the above essential parts of this equipment which consists of various control valves usually made mostly of cast iron, or in some cases Al, and which contains parts made of brass, Zn die castings, steel, and plastics.

11985* Corrosion. 6. Prevention of Corrosion by Means of Inhibitors. R. S. Thornhill. *Research*, v. 5, July 1952, p. 324-332.

Discusses in detail recent theories of inhibitive action. Properties of the more common inhibitors are described and also their industrial uses. 41 ref.

11986* Corrosion. 7. Corrosion Testing. W. C. Britton. *Research*, v. 5, Aug. 1952, p. 377-384.

Discusses service, field, and laboratory tests. 46 ref.

11987* Structure and Corrosion of Aluminum-Magnesium and Aluminum-Zinc-Magnesium Alloys. Mechanism of Intergranular and Stress Corrosion. (Concluded.) Part III. Structure and Corrosion of Aluminium-Zinc-Magnesium Alloys. Part IV. Mechanism of Intergranular Corrosion and Stress Corrosion. (French.) Pierre A. Jacquet. *Revue de Métallurgie*, v. 39, June 1952, p. 439-452.

Reviews the above on the basis of the literature. Discusses in particular the nature of above alloys, influence of thermal treatment on surface conditions, and of plastic deformation on corrosion. The mechanisms of anodic attack, and of stress corrosion, are indicated. Tables, graphs, and micrographs. 36 ref.

11988 Bearing Corrosion Studied. *Steel*, v. 131, July 28, 1952, p. 84, 87.

Gives results of tests on the Navy's amine-acid inhibitor for brass-retainer ball bearings.

11989* Protection of Ferrous Surfaces Against Corrosion. (Italian.) Erica Antinori. *Tecnica Italiana*, v. 7, May-June, 1952, p. 163-167.

Presents results of further experiments similar to those described in a previous article. (Mar.-Apr. 1951 issue.) Use of more concentrated solutions was studied. An emulsible oil containing sulfonic soaps gives fairly good protection from rust on cast iron. Concludes with a few practical notes on use of chromates for treatment of engine cooling water. Test-panel photographs.

11990* A Specific Corrosion Phenomenon on Tungsten Contacts. (German.) Albert Keil. *Werkstoffe und Korrosion*, v. 3, July 1952, p. 263-265.

During the storage of apparatus containing large quantities of insulating materials, corrosion products are formed occasionally on the surface of tungsten contacts. Factors promoting such reactions are mentioned and importance of the phenomenon is discussed.

11991* Improvements in the Development of Corrosion-Resisting Materials. (General Survey). Part I. Iron and Steel. (German.) Erich Franke. *Werkstoffe und Korrosion*, v. 3, July 1952, p. 265-274.

Based on the most important relevant publications of 1950, a survey is given of the corrosion behavior of carbon steels, low- and high-alloy stainless steels, Fe-Si alloys, and cast iron. The substitution of Ti for Cb in stabilized 18-8 stainless steels is discussed. 168 ref.

11992* Anodic Solution of Germanium. (German.) Franz Jirsa. *Zeitschrift für anorganische und allgemeine Chemie*, v. 268, nos. 1-2, 1952, p. 84-88.

Discusses results of experimental study on behavior of germanium anodes in acid and alkaline solutions. Results are tabulated and charted.

Books

11993 The Corrosion Resistance of Tin and Tin Alloys. S. C. Britton. 77 pages. 1952. Tin Research Institute, Greenford, Middlesex, Eng. (TN793 B77c)

Provides guiding principles, backed by results obtained in defined conditions, to aid in diagnosing cause of corrosion and in assessing the prospects on the metal in new circumstances. Arranged in 3 parts: Corrosion of Tin; Alloys of Tin; and Coatings of Tin and Tin Alloys. Includes coatings of Sn on Fe, steel, Cu and its alloys, Pb and Al; Pb, Zn, Cd, Cu, and Ni as alloying elements; solders, fusible alloys, and bearing metals. Tables and numerous references.

See also:
11722 (corrosion of light-alloy welds)
11739 (corrosion resistance of brazed stainless-steel joints)

11749 (scaling resistance of heat-resistant steels)
11755 (softening treatment vs. corrosion resistance of stainless)
11792 (anodic protection of light alloys)
11805 (metallography of scaled surfaces)
11867 (oxidation of Cu and Sb)
11890 (corrosion resistance of Al-Zn-Mg alloys)
12139 (corrosion of springs)
12245 (corrosion during fuel-gas combustion)
12246 (corrosion of appliances by fuel-gas combustion)
12970 (corrosion of ancient bronzes)

15. ANALYSIS—CHEMICAL AND PHYSICAL

11994 Some Applications of the Fluorescent X-Ray Spectrometer in Ceramics. Robert F. Patrick. *Journal of the American Ceramic Society*, v. 35, Aug. 1, 1952, p. 189-193.

Theory is briefly reviewed. Describes use to determine quantitatively the Ni plated out in nickel pickling, the amounts of Co and Ni deposited on the base metal during the firing of enamel ground coats, and the Pb content of a glaze frit. Advantages and disadvantages are discussed. 12 ref.

11995* Solvent Fractionation of Polycarboxylic Acids From Oxidation of Coal. A. N. Roy and H. C. Howard. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3239-3242.

Describes how separation of above acids can be made directly on the basis of molecular weight, by the solvent pair etherpentane and on the basis of structure by acetone-benzene mixtures. Includes information on amounts found of individual components. Table and diagrams.

11996* The Determination of Rosin in Fatty Acids. Richard Herrlinger and Gerald M. Compeau. *Journal of the American Oil Chemists' Society*, v. 29, Aug. 1952, p. 342-344.

Method described is based on acid-catalyzed selective esterification of a large sample, removal of the acid catalyst, titration of the unesterified rosin acids, and application of an empirical correction factor to the results. Excellent agreement is obtained between various analysts, and rosin-acids content can be determined to within ±0.1%. 14 ref.

11997 The Determination of Oxalates in Fresh Paint Material. C. J. L. Baker. *Analyst*, v. 77, July 1952, p. 340-344; disc., p. 344.

A method is described for determining total oxalates in plants, by extraction with HCl, precipitation as calcium oxalate from the deproteinized extract, and subsequent titration with $KMnO_4$. Soluble oxalates are determined in a similar manner, in aqueous extract. The later stages of the determination are carried out on a semimicro scale.

11998 Changes in Potential of the Dropping-Mercury Electrode During Drop-Formation, and Measurement of Potential in Polarographic Analysis. W. Furness. *Analyst*, v. 77, July 1952, p. 345-355.

With a Tinsley polarograph, reasonable agreement was found between calculated and observed effects. Difficulties with polarographic cells incorporating a quiet mercury pool to conduct the diffusion current are not always satisfactory; in contact with certain oxy-acids of sulfur, for example, such electrodes may acquire insoluble films, in which case their potential and electrical resistance becomes erratic. These complications are avoided by means of cells having a pair of permanently attached calomel electrodes. 11 ref.

11999 The Reproducibility of Geometrical Correction Procedures in the Spectrophotometric Estimation of Vitamin A. H. H. Bagnall and F. G. Stock. *Analyst*, v. 77, July 1952, p. 356-363.

Recent evaluations of the precision of above correction procedures are discussed. Spectrophotometric data are given. Experience with recent modifications of the method is described. 15 ref.

12000 The Choice of Doses in Bio-Assays. P. R. Booth. *Analyst*, v. 77, July 1952, p. 363-366.

Tells how the precision of a bioassay is enchanced by applying a simple formula to available information about the probable potency of a material, even when such information is vague.

12001 The Determination of the Isocyanate Group in Rubber Bonding Agents. A. G. Williamson. *Analyst*, v. 77, July 1952, p. 372-374.

A potentiometric method based on the reaction between isocyanates and di-isobutylamine in an inert solvent. Comparison of results with those of other methods.

12002 An Ester-Fractionation Method for the Component Fatty Acid Analysis of Mixtures Containing Hydroxy Fatty Acids. K. T. Achaya and S. A. Saletore. *Analyst*, v. 77, July 1952, p. 375-380.

18 references.

12003* The Mathematical Treatment of Reactions in Volumetric Analysis. (English.) Edmund Bishop. *Analytica Chimica Acta*, v. 7, July 1952, p. 15-19.

12004* Microphotometric Reaction of Tungsten. (French.) Arthur De Sousa. *Analytica Chimica Acta*, v. 7, July 1952, p. 24-26.

A microphotochemical reaction is described based on the fact that ultraviolet radiation reduces hexavalent tungsten (freshly prepared tungstic acid) to tetravalent tungsten in the presence of C_2H_5OH. The method is simple and rapid, and elements which usually accompany tungsten do not interfere.

12005* The Determination of Small Amounts of Vanadium in the Presence of Large Amounts of Uranium. (English.) S. H. Simonsen. *Analytica Chimica Acta*, v. 7, July 1952, p. 33-36.

To eliminate color interference in determination of V by the Hamner method, the V was separated prior to titration by extraction of vanadium cupferrate with chloroform. The chloroform extract was evaporated with H_2SO_4 and the excess cupferron removed by oxidation with HNO_3 and $HClO_4$. The V was reduced with ferrous ammonium sulfate solution, the excess ferrous ion oxidized with ammonium persulfate, and the vanadium (IV) titrated with 0.02 N $KMnO_4$.

12006* Rapid Gravimetric Determination of Beryllium in Beryl. (French.) J. Hure, M. Kremer, and F. Le Berquier. *Analytica Chimica Acta*, v. 7, July 1952, p. 37-41.

After attacking the beryl by fusing the powdered mineral with Na_2O_2 and eliminating SiO_2, Be is precipitated directly in the filtrate by monoammonium phosphate in the presence of complexone II or ethylenediamine tetra-acetic acid.

12007* Photometric Determination of Traces of Molybdenum After Sulfide Precipitation. (English.) R. B. Hendrickson and E. B. Sandell. *Analytica Chimica Acta*, v. 7, July 1952, p. 57-62.

12008* Determination of Nitrogen in Steel. (English.) R. H. A. Crawley. *Analytica Chimica Acta*, v. 7, July 1952, p. 63-67.

Accuracy of measurement of small amounts of nitrogen in steel by chemical methods is dependent on satisfactory procedures for converting the nitrides into NH_3, and for measuring the NH_3 thus formed. Color intensity is measured on an absorptiometer.

12009* Analytical Applications of Complexones. II. Colorimetric Nitrate Determination. (German.) F. L. Hahn. *Analytica Chimica Acta*, v. 7, July 1952, p. 68-69.

12010* The Colorimetric Estimation of Trichloracetic Acid. (English.) G. L. Mills. *Analytica Chimica Acta*, v. 7, July 1952, p. 70-76.

12011* Interpretation of Potentiometric Measurements by Means of Polarization Curves. J. Coursier. *Analytica Chimica Acta*, v. 7, July 1952, p. 77-74.

Experimental results of potentiometric determinations are explained by means of polarization curves. Explanations are given of the following phenomena: electrical activity of ions and its absence; nature of electrode; time required to establish a stable potential; significance of limiting potentials and concentrations; influence of oxygen on measured potentials and on limit of electrical activity of the oxidants; significance of the "irreversible" potentials; formulas giving potentials in the presence of oxygen; and value of removing oxygen from solutions for potentiometric determinations. 12 ref.

15. *Analysis—Chemical and Physical*

12012 Analytical Methods for Butadiene. *Analytical Chemistry,* v. 24, July 1952, p. 1080-1094.

Consists of following papers presented at a Symposium on Analytical Methods in Manufacture and Utilization of Butadiene held Feb. 6, 1952, in Washington, D. C.: "Determination of Individual Acetylenes in Butadiene and in C_4 Hydrocarbon Fractions", R. F. Robey, B. E. Hudson, Jr., and H. K. Wiese; "Manganous Hydroxide Method of Test for Oxygen in Butadiene Vapors", Grant W. Taylor and D. S. Alexander; "Determination of Light Hydrocarbons in Water–Carbon Dioxide Stripping Method", L. A. Webber and C. E. Burks; "A Differential Refractometer for Process Control", E. C. Miller, F. W. Crawford, and B. J. Simmons; "Ultraviolet Spectrophotometric Method of Determining p-tert-Butyl Catechol", G. G. Campbell and Shirley A. Tacker; "Determination of Acetylenes in Specification Butadiene–Adapation of Rubber Reserve Method," R. E. Hyzer; "Routine Determination of C_4 Hydrocarbons in Furfural or Absorber Oil", R. E. Hyzer. 26 ref.

12013 Behavior of Nitrogen and Some of Its Compounds in Steel. H. F. Beeghly. *Analytical Chemistry,* v. 24, July 1952, p. 1095-1100.

Practical methods for determining how much N is combined with a given element are described and discussed. Illustrative examples of the behavior of N during thermal treatment of steels containing Al, Si, and V are given. The analytical techniques should be helpful in research on reactions of N in steel with Al, Si, Cb, Ti, Ta, V, and Zr, and for establishing relationships between composition of steel and its physical properties. They may find application in analysis of metals such as Ti or Zr. Graphs and tables. 12 ref.

12014 Direct Spectrophotometric Titrations With Bromate-Bromide Solutions. Philip B. Sweetser and Clark E. Bricker. *Analytical Chemistry,* v. 24, July 1952, p. 1107-1111.

The above were inestigated and a simple bromometric procedure for addition and substitution reactions as well as for some inorganic applications was developed. Tables and graphs. 23 ref.

12015 Determination of Lead by Centrifugation of Lead Sulfate. Richard C. Jarnagin, James T. Jones, Otto L. Willbanks, and Charles T. Kenner. *Analytical Chemistry,* v. 24, July 1952, p. 1115-1117.

Describes development of a rapid control method for determination of the above. The proposed method is accurate to within ±1% of the amount present for samples containing from 0.500-1.000 g. of Pb. Graphs and tables.

12016 Photometric Determination of Aluminum in Manganese, Bronze, Zinc Die Casting Alloys, and Magnesium Alloys. C. L. Luke and K. C. Braun. *Analytical Chemistry,* v. 24, July 1952, p. 1120-1122.

Describes development of a rapid reliable method for determination of Al occurring as a major constituent in Cu, Zn, and Mg alloys.

12017 Photometric Determination of Aluminum in Lead, Antimony, and Tin and Their Alloys. C. L. Luke. *Analytical Chemistry,* v. 24, July 1952, p. 1122-1126.

Describes method applicable to the analysis of the above and also to a wide variety of other ferrous and nonferrous alloys.

12018 Refractometric Adsorption Analyses; Use of Automatic Recording Differential Refractometer. R. A. Glenn, Joy S. Wolfarth, and C. W. Dewalt, Jr. *Analytical Chemistry,* v. 24, July 1952, p. 1138-1143.

The battery-operated continuous automatic recording differential refractometer of Zaukelies and Frost was adapted to 115-volt a.c. operation and investigated as a tool for following the progress of liquid chromatography of colorless materials according to a technique described by Claesson. Data are given on analyses of methylcyclohexane-toluene mixtures on silica gel and examples are presented of use of the refractometer in the chromatography of coal-hydrogenation products. Graphs, tables, and circuit diagrams. 12 ref.

12019 Chemical Method for Determining Vitamin B_{12}. G. O. Rudkin, Jr., and R. J. Taylor. *Analytical Chemistry,* v. 24, July 1952, p. 1155-1156.

Describes method for determining vitamin B_{12} in fermentation broths and crude concentrates with a speed and accuracy not possible with biological assay.

12020 Sodium Aminoethoxide Titration of Weak Acids in Ethylenediamine; Application to Determination of Phenols in Coal Hydrogenation Oils. Max Katz and R. A. Glenn. *Analytical Chemistry,* v. 24, July 1952, p. 1157-1163.

Data are presented on the precision and accuracy of the titration of known phenols, both unhindered and hindered, carboxylic acids, and synthetic mixtures, and on advantages of this new method. Titration curves.

12021 Colorimetric Determination of Niobium Using Thiocyanate. Allen B. H. Lauw-Zecha, Samuel S. Lord, Jr., and David N. Hume. *Analytical Chemistry,* v. 24, July 1952, p. 1169-1173.

Describes a systematic spectrophotometric study of the reaction between Cb and thiocyanate which led to the development of a rapid spectrophotometric method for determination of microgram quantities of Cb. It is said to be the most sensitive and reproducible colorimetric method yet reported. Graphs and tables.

12022 Colorimetric Determination of N-Trichloromethylthiotetrahydrophthalimide. Allen R. Kittleson. *Analytical Chemistry,* v. 24, July 1952, p. 1173-1175.

12023 Volumetric Determination of Milligram Quantities of Uranium. Claude W. Sill and Heber E. Peterson. *Analytical Chemistry,* v. 24, July 1952, p. 1175-1182.

The accuracy attainable with the method described ranges about 2% with 1 mg. of U to within ±0.1% with 20 mg. or more. Designed to cover the intermediate-quantity range, but is also applicable to larger quantities. Numerous tables. 16 ref.

12024 Automatic Drop Timer for Use With Dropping Mercury Electrodes. Louis Meites and Julian M. Sturtevant. *Analytical Chemistry,* v. 24, July 1952, p. 1183-1184.

Describes above apparatus, which compares data on the average drop time thus secured with data on the lives of individual drops. Circuit diagram.

12025 Determination of Calcium and Magnesium in Limestones and Dolomites. Application of the Ethylenediaminetetraacetic Acid Method. John J. Banewicz and Charles T. Kenner. *Analytical Chemistry,* v. 24, July 1952, p. 1186-1187.

12026 Determination of p-Chlorophenyl p-Chlorobenzenesulfonate in Spray Residues on Fresh Fruits. A. H. Kutschinski and E. N. Luce. *Analytical Chemistry,* v. 24, July 1952, p. 1188-1190.

A colorimetric procedure is presented for the above. The method should be applicable to other food crops.

12027 Improved Machine Method for Calculation of Mass Spectrometer Analyses. E. C. Daigle and H. A. Young. *Analytical Chemistry,* v. 24, July 1952, p. 1190-1194.

Describes an improved calculating-machine method which permits reduction of a 24-component matrix in as little as 2 hrs. to a form suitable for repeated use with the same calibration coefficients. Using the reduced matrix, 24-component mitxures may be evaluated in about 30 min. Tables.

12028 Amperometric Titration of Zinc With Potassium Ferrocyanide. A. L. Woodson, B. H. Johnson, and S. R. Cooper. *Analytical Chemistry,* v. 24, July 1952, p. 1198-1199.

Investigation was undertaken to ascertain the possibility of obtaining reproducible and sufficiently accurate stoichiometric results in direct titration of small amounts of Zn with potassium ferrocyanide under acid conditions.

12029 Analysis of Mixtures of Chloride and Bromide by Ion-Exchange Chromatography. William Reiman, III, and Siegfried Lindenbaum. *Analytical Chemistry,* v. 24, July 1952, p. 1199-1200.

12030 Paper Chromatography of Nucleic Acid Derivatives. D. C. Carpenter. *Analytical Chemistry,* v. 24, July 1952, p. 1203-1204.

Describes separation of the common bases, nucleosides, and nucleotides employing several single-phase mixed solvents in which 1-propanol, isoamyl, and tetrahydrafurfuryl alcohols, and an aqueous solution of a buffer salt are used to control pH.

12031 Modification of Millin's Rapid Method for Determining Carbon and Hydrogen in Organic Compounds. S. S. Israelstam. *Analytical Chemistry*, v. 24, July 1952, p. 1207-1209.

Tables and schematic diagram of apparatus.

12032 Rapid Micromethod for Determining Carbon and Hydrogen in Organic Compounds. O. G. Backeberg and S. S. Israelstam. *Analytical Chemistry*, v. 24, July 1952, p. 1209-1214.

Numerous tables and diagrams. 40 ref.

12033 Luminol as a Chemiluminescent Indicator in Photometric Titration of Solutions of High Opacity. Frederic Kenny and R. B. Kurtz. *Analytical Chemistry*, v. 24, July 1952, p. 1218-1219.

12034 Molecular Structure and Spectroscopy. *Analytical Chemistry*, v. 24, July 1952, p. 1223-1228.

Abstracts of papers presented at a symposium on the above sponsored by Dept. of Physics and Astronomy and Graduate School, Ohio State University, and held June 9-13, 1952.

12035* Recent Results in the Quantitative Spectrochemical Analysis of Silicates. (German.) Fr. Hegemann. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.*, v. 29, Mar. 1952, p. 68-73.

Review of literature. 30 ref.

12036* A Simple Method of Analysing Paper-Strips in Electrophoresis on Filter-Paper (English.) G. A. J. Van Os. *Biochimica et Biophysica Acta*, v. 9, July 1952, p. 111-112.

12037* An Improved Apparatus for the Differential Thermal Analysis of Minerals. J. J. Theron. *British Journal of Applied Physics*, v. 3, July 1952, p. 216-220.

Circuit diagrams and graphs. 13 ref.

12038 X-Ray Diffraction Pattenrs of Dinitrophenyl Derivatives of Amino Compounds. H. M. Rice and F. J. Sowden. *Canadian Journal of Chemistry*, v. 30, Aug. 1952, 575-580.

The 2,4-dinitrophenyl derivates of a number of amino compounds were prepared and x-ray powder diffraction measurements made. These derivatives appear to be suitable for identification purposes. Numerous tables. 11 ref.

12039 An Ultramicro Method for Quantitative Determination of Amino Acids. Eunice F. Wellington. *Canadian Journal of Chemistry*, v. 30, Aug. 1952, p. 581-591.

A simple, quantitative method for determination of amino acids in about 300 μgm. protein is described. The amino acids are separated by two-dimensional paper chromatography. Discusses factors known to affect the color reaction, its concentration, time of development and environmental temperature and humidity. Graphs and tables. 37 ref.

12040* Direct Determination of Oxygen in Solid Fuels. (French.) Henri Guérin, Marthe Bastick, and Paul Marcel. *Chaleur & Industrie*, v. 33, June 1952, p. 177-180.

Discusses two methods for determining O_2 content of coal, one based on a hydrogenation method and the other on reduction by carbon. Both can be applied to sulfur-rich coals. Includes tabular data. 21 ref.

12041* The Analytical Chemistry of Magnesium. *Chemical Age*, v. 67, July 12, 1952, p. 47-52.

The above includes discussion of classical methods of removing various elements from Mg; oxine separation; Mg in alloys; electrolysis; colorimetric determination; and other methods.

12042* Direct Titration of Elements Chromatographed on Paper on a Microgram Scale: Molybdenum and Vanadium. (French.) Alice Lacourt, Ghislaine Sommereyns, Jeannine Hoffman, Anne Stadler, and Georges Wantier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 9, 1952, p. 2365-2367.

Describes advantages of such direct titration. Details of the results are indicated.

12043* Spectrographic Determination of Lead in Blood. (French.) Vincent Brustier, Pierrette Cornec, and Henri Triché. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 9, 1952, p. 2367-2369.

12044* Determination of the Atomic Concentrations of Thorium and Uranium in Minerals by Means of X-Ray Emission Spectrography. (French.) Madeleine Tournay. *Comptes Rendus hebdomadaries des Séances de l'Académie des Sciences*, v. 234, June 23, 1952, p. 2527-2529.

Describes method for the above. Includes graph to facilitate the work.

12045* A Spectrophotometric Method for Determination of Low Carbon Contents. (Swedish.) Per Enghag. *Jernkontorets Annaler*, v. 136, no. 5, 1952, p. 113-123.

Method for metallic materials is described. After burning the sample in O_2, SO_2 is removed by chromic acid and CO_2 is absorbed in NaOH solution containing a pH indictor. Decrease in concentration of the basic indicator is followed in a spectrophotometer. Alizarine-yellow R is shown to be useful indicator.

12046* New Polarographic Electrode. (French.) P. Lévèque. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, May 1952, p. 267-272.

Describes above electrode, consisting of a Pt wire with an amalgamated surface, along which the mercury flows. Its advantages in comparison with the dropping mercury electrode, and various analytical properties, are indicated. Graphs. 10 ref.

12047* Two-Line-Pair Nomograph for Non-Parallel Working Curves in Spectrographic Evaluation. J. L. Flounders. *Journal of Applied Chemistry*, v. 2, June 1952, p. 295-296.

Nomographic evaluation of 2-line-pair method of spectrographic analysis is extended, by a simple geometric construction, to include non-parallel working curves such as are obtained when a neutral filter is not used.

12048* The Volumetric Determination of Melamine as Oxalate. J. R. Steele, J. H. Glover, and H. W. Hodgson. *Journal of Applied Chemistry*, v. 2, June 1952, p. 296-298.

Addition of an aqueous solution of melamine to a 20% solution of oxalic acid in ethanol produces a crystaline precipitate of melamine mono-oxalate. The method is accurate to 0.3% melamine.

12049* The Determination of Fluorine in Polytetrafluoroethylene. J. Haslam and S. M. A. Whettem. *Journal of Applied Chemistry*, v. 2, June 1952, p. 339-344.

The sample is fused with Na_2O_2 in a Parr bomb and the aqueous extract of the melt is distilled with perchloric acid in the presence of silica. The fluoride is titrated with thorium nitrate solution using sodium alizarinsulfonate as indicator.

12050 The Determination of Sulphur, Sulphide, Thiosulphate, Sulphite and Sulphate in Commercial Calcium Chloride. D. N. Fogg and N. T. Wilkinson. *Journal of Applied Chemistry*, v. 2, July 1952, p. 357-367.

Tables.

12051 A Physical Method of Analysing Sulphur Dichloride. G. H. Whitting. *Journal of Applied Chemistry*, v. 2, July 1952, p. 381-390.

Based on density and refractive index. Also reports determination of these properties for SCl_2, S_2Cl_2, and mixtures. Graphs, tables, diagrams, and nomogram. 11 ref.

12052 Sulphur in Oil Shale or Torbanite. Geo. E. Mapstone and B. Nartsissov. *Journal of Applied Chemistry*, v. 2, July 1952, p. 405-408.

Determination and properties of the classes of S in above. Tables.

12053* Chromatographic Separation of DDT and Some of Its Known and Possible Degradation Products. James Sternburg and C. W. Kearns. *Journal of Economic Entomology*, v. 45, June 1952, p. 505-509.

By a succession of solvents, DDE, DDT, 4,4'-dichlorobenzophenone, and 4,4'-dichlorobenzhydrol are eluted separately from an alumina column.

12054* The Analysis of the Alcohol-Insoluble Nitrogen of Plants by Quantitative Procedures Based on Paper Chromatography. I. The Analysis of Certain Pure Proteins.

15. *Analysis—Chemical and Physical*

II. The Composition of the Alcohol-Soluble and Insoluble Fractions of the Potato Tuber. John F. Thompson and F. C. Steward. *Journal of Experimental Botany*, v. 3, June 1952, p. 170-187.

35 references.

12055 The Use of Diffraction Gratings With an Infra-Red Spectrometer. J. D. S. Goulden. *Journal of Scientific Instruments*, v. 29, July 1952, p. 215-216.

A simple experimental arrangement is described in which a plane replica grating is used to obtain high dispersion in the 3μ region. Apparatus diagrams and spectrograms.

12056 Wavelength Calibration of Infra-Red Spectrometers in the Wavelength Region 15-25μ and the Selection of Solvents. L. W. Marrison. *Journal of Scientific Instruments*, v. 29, July 1952, p. 233.

Discusses use of absorption bands of H_2O and CO_2 for calibration. Gives list of numerous solvents with the infrared regions in which they can be used for absorption-spectra work with solids. Spectrograms and table.

12057 The Spectrochemical Analysis of Tungsten. C. H. R. Gentry and G. P. Mitchell. *Metallurgia*, v. 46, July 1952, p. 47-51.

Gives details of recommended procedures. Working curves and tabular data.

12058 The Photometric Determination of Arsenic and Antimony in Tin. W. C. Coppins and J. W. Price. *Metallurgia*, v. 46, July 1952, p. 52-54.

Method described obviates the necessity of working with large samples. A preliminary separation is necessary in the case of both elements, after which the molybdenum blue method is used for As and the iodo-antimonite complex method for Sb.

12059* A Modification of the Dumas-Pregl Micro-Determination of Nitrogen. (German.) W. Schöniger. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 3, 1952, p. 229-233.

As many as 4 analyses can be made in an hour with the same accuracy as before. This is accomplished by precombustion of the sample mixed with powdered copper oxide in a separate exchangeable combustion tube.

12060* Micro- and Semi-Micro Determination of Halogens. (English.) Wolfgand Kirsten and Izeael Alperowicz. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 3, 1952, p. 234-244.

Rapid methods for the above by dry combustion are described. Semimicro samples are burned in a quartz capsule. The halogen is expelled from ash-containing compounds by V_2O_5. The halogens are absorbed in hot alkali. Cl and Br are titrated with alcoholic $AgNO_3$, mercuric halogenide-diphenylcarbazide being used as indicator. Iodine is titrated with thiosulfate after oxidation to iodate.

12061* Microvolumetric Halogen Determination in Organic Materials by Peroxide Decomposition. (German.) Gerald Kainz and Albert Resch. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 3, 1952, p. 292-298.

An argentometric titration employing starch iodine solution is described, which furnishes a sharp endpoint, despite high salt concentration and large volume. 21 ref.

12062* Microtitrations With Ethylenediaminetetraacetic Acid III. Direct Titration of Lead. (German.) H. Flaschka. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 3, 1952, p. 315-318.

12063 An Alkaline Solution of Potassium Chromate as a Transmittancy Standard in the Ultraviolet. Geraldine W. Haupt. *Journal of Research of the National Bureau of Standards*, v. 48, June 1952, p. 414-423.

28 references.

12064 Micro-Chemical Determination of Magnesium, Calcium and Zinc With Disodium Ethylene-Diamine Tetra-Acetic Acid. Eric W. Debney. *Nature*, v. 169, June 28, 1952, p. 1104-1105.

Complete description of a method for the above determination is given.

12065 Identification of Organic Compounds From Infra-Red Spectra. A. E. Martin. *Nature*, v. 170, July 5, 1952, p. 20-22.

Discusses possibility and advantages of a cooperative program to obtain a complete catalogue of infrared spectra of organic compounds. Discusses experimental procedure, filing system, some difficulties, and costs.

12066*The Use of Self-Absorbing Spectral Lines in Quantitative Determination of Rubidium. A. Halperin and S. Sambursky. *Journal of the Optical Society of America*, v. 42, July 1952, p. 475-481.

A quantitative analysis of salts of the Dead Sea for their Rb contents was carried out. It was found necessary to use the resonance lines of Rb (at 7800; 7948A) as analysis lines. A corrected formula was deduced, and with this correction the analyses were carried out with good results for concentrations of rubidum chloride from 0.005%-0.1%. Tables, graphs. 14 ref.

12067* An Analysis of the Factors in Spectrochemical Microanalysis. J. K. Hurwitz. *Journal of the Optical Society of America*, v. 42, July 1952, p. 484-489.

Microanalytical apparatus was designed and contructed for study of diffusion in metals and alloys and analysis of segregates and inclusions. Versatility in changing photographic plate and sample speeds was included in the design. Graphs and tables.

12068* Spectrochemical Determination of Tantalum and Columbium in 18 Cr—8 Ni Stainless Steel. W. J. Poehlman and R. E. Sarnowski. *Journal of the Optical Society of America*, v. 42, July 1952, p. 489-492.

A spectrographic method for determination of Ta and Cb, in the concentration ranges 0.01-0.40% and 0.30-1.25%, respectively, is described. Includes reference analyses, comparisons, working curves, and standards.

12069* Multiple Monochromators. III. Quadruple Monochromator and Its Application to Infrared Spectroscopy. N. S. Ham, A. Walsh, and J. B. Willis. *Journal of the Optical Society of America*, v. 42, July 1952, p. 496-500.

Describes design of above, and illustrates its performance by means of typical spectra.

12070 50 Years of Petroleum Chromatography. Part 1. Empirical and Scientific Eras. Part 2. Technological Era. *Petroleum Processing*, v. 7, June 1952, p. 812-814; July 1952, p. 973-976.

79 references.

12071 The Spectral Emissivities of Iron, Nickel, and Cobalt. H. Lund and L. Ward. *Proceedings of the Physical Society*, v. 65, sec. B, July 1, 1952, p. 535-540.

Above were measured by direct comparison of surface and black-body radiation between 1000 and 1300°C. over the wavelength range 1.0-2.6μ using a PbS cell and amplifier as the detecting unit. Results are discussed. Diagrams, tables and graphs. 13 ref.

12072* Preparation and Thermogravimetric Analysis of Dithiozonates of Silver, of Lead, of Zinc, and of Copper. (French.) Jean-Charles Pariaud and Pierre Archinard. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, June 1952, p. 634-638.

12073* Separation of Small Amounts of Thorium From the Cerite Earths of Monazite and Other Elements. Use of Cinnamic Acid. (English.) K. V. S. Krishnamurty and Ch. Venkateswarlu. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, June 1952, p. 668-670.

12074* Vanillic Acid—A New Reagent for Thorium. (English.) K. V. S. Krishnamurty and A. Purushottam. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, June 1952, p. 671-675.

12075* Molecular Analysis of Lead-Coating Compounds in Minerals and Metallurgical Products. (French.) R. Collee. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et dest Arts appliqués a l'Industrie*, ser. 9, v. 8, July 1952, p. 264-269.

Describes new scheme for the above. Details and advantages are outlined.

12076* Considerations Relative to Determination of Oxygen, and of Inclusions, in Steel. (French.) J. Varetto and L. Lacomble. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 8, July 1952, p. 270-274.

Describes and tabulates various methods for the above, particularly the Gotta method, also the vacuum-fusion method. Proposes improvements in them.

12077* Spectrographic Determination of Fluorine in Slags. (French.) J. Gillis, J. Eeckhout, and N. Kemp. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 8, July 1952, p. 284-288.

Describes a continuous arc method for the above. Results of the method are indicated; range of accuracy is given.

12078* Contribution to the Study of Standard Methods for Determination of Volatile Material. (Italian.) C. Padovani, C. Siniramed, and E. Strambi. *Rivista dei Combustibili,* v. 6, May 1952, p. 301-315.

Reviews different analytical methods employed for determination of the volatile matter in coal. Tests carried out with single samples delivered to the laboratories of Belgium, Denmark, France, England, Italy, Holland, and Sweden making use of Belgian, French, and English methods are described. Results are compared and discussed. Tables.

12079* Determination of Free Sulfur in Vulcanized Rubber Mixtures. Horst Frey. *Rubber Chemistry and Technology,* v. 25, Apr.-June 1952, p. 365-370. (Translated from *Fresenius' Zeitschrift für analytische Chemie,* v. 133, no. 4, 1951, p. 274-282.)

Previously abstracted from original.

12080* Determination of Total Sulfur in Vulcanized Rubber Mixtures. Horst Frey. *Rubber Chemistry and Technology,* v. 25, Apr.-June 1952, p. 371-374. (Translated from *Analytica Chimica Acta,* v. 5, Aug. 1951, p. 375-379.)

A method is described, which, by means of a resin ion-exchange agent, makes possible elimination of disturbing effects of foreign cations, particularly Fe and Cr, in determination of the total S in vulcanized-rubber mixtures. The procedure involves precipitation of the sulfate by benzidine and determination by titration with aqueous NaOH. 10 ref.

12081* Application of High Frequency Titration. I. Rapid Determination of Lime in Basic Slags. (English.) Sôichiô Musha. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 55-61.

Apparatus described and diagrammed; typical data tabulated and charted.

12082* Quantitative Inorganic Chromatography I. Chromatography on Filter Paper Impregnated With Aluminum Hydroxide. (English.) Yoshinaga Oka and Akira Murata. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 82-90.

12083* Fluorescence Analysis. XV. On Oxidimetric and Reductometric Titrations With Rivanol, Phosphine and Harmine as Fluorescence Indicators. (English.) Hidehero Goto and Yachiyo Kakita. *Science Reports of the Research Institutes, Tohoku University,* ser. A. v. 3, Apr. 1951, p. 155-164.

12084* Microgravimetric Determination of Potassium in the Form of Tetraphenylboropotassium. (German.) H. Flaschka. *Fresenius' Zeitschrift für analytische Chemie,* v. 136, no. 2, 1952, p. 99-102.

Describes Raff and Brotz's rapid, simple, and accurate method for the above. Data are tabulated.

12085* Analytical Applications of Trithiocarbonic Acid. 3. Determination of Molybdenum. (German.) E. Gagliardi and W. Pilz. *Fresenius' Zeitschrift für analytische Chemie,* v. 136, no. 2, 1952, p. 103-109.

Shows that above compound has several advantages over H_2S in the above. Experimental data are tabulated. 14 ref.

12086* Chromatography With Calcium Sulfate Bars in the Qualitative Cu/Cd and As/Sb/Sn Separation. (German.) Binayendra Nath Sen. *Zeitschrift für anorganische und allgemeine Chemie,* v. 268, nos. 1-2, 1952, p. 99-100.

Brief discussion on above is based on the fact that calcium sulfate can be used as an adsorbent in the separation of certain inorganic ions.

12087* Polarographic Determination of Indium in the Presence of Other Metals, Especially Zinc. (German.) Günther Rienäcker and Erhard Hoschek. *Zeitschrift fur anorganische und allgemeine Chemie,* v. 268, nos. 4-6, 1952, p. 260-267.

Reviews existing methods and describes a method of preventing the interfering effect of Cd. This method can also be used to determine In in commercial Zn. Graphs and tables. 10 ref.

Miscellaneous Publications

12088 Determination of Tungsten and Molybdenum in High Molybdenum High-Speed Steels. B. E. Jaboulay. Henry Brutcher, Translation 2774, 7 pages. (From *Revue de Métallurgie,* v. 47, Jan. 1950, p. 53-54.)

Procedure suitable for high-speed steels containing 2-6% Mo. Elimination of preliminary separation of up to 4% V, and underlying theory.

12089* Codes and Instructions for Wyandotte Punched Cards Indexing Infrared Absorption Spectrograms. Lester E. Kuentzel. Wyandotte Chemicals Corp. (Wyandotte, Mich.), 1951, 17 pages. (HF5371 K95c)

Gives details of IBM system for the above.

Books

12090 Identification of Textile Materials. 94 pages. 1951. Textile Institute, Manchester, England. (TS1449 T31i3)

Comprises text information on properties and tests, extensive tables, and numerous photomicrographs.

See also:
11600 (ion-exchange separation of Re from Mo)
11643 (analysis of cast iron)
12469 (separation of Am and Cm)
12538 (polarography of organic compounds)
12552 (infrared analysis of steroids)
12960 (ion-exchange separation of Zr, Hf, and rare earths)

16. APPARATUS, METHODS, AND STANDARDS

12091* A Device for Calculating Structures Factors. (English.) W. L. Bragg. *Acta Crystallographica,* v. 5, July 1952, p. 474-475.

Above device consists of dials on a pivoted table which are set to create moments proportional to the terms, and the sum is obtained by restoring the balance with an applied torque. Illustrated.

12092* On the Relations Between Fourier and Least-Squares Methods of Structure Determination. (English.) D. W. J. Cruickshank. *Acta Crystallographica,* v. 5, July 1952, p. 511-518.

A criterion for determining atomic coordinates in the Fourier method, applicable to resolved or unresolved peaks, is introduced. A criterion for finding atomic coordinates from the Patterson density leads to refinement equations which are similar to the normal equations. Both centrosymmetric and noncentrosymmetric space groups are considered. Approximate forms of the equations and the relationship of this work to earlier work by Booth, Cochran, and Cruickshank are discussed.

12093* Tables of Absorption Factors for Spherical Crystals. (English.) H. T. Evans, Jr. and Miriam G. Ekstein. *Acta Crystallographica,* v. 5, July 1952, p. 540-542.

Tables are presented which give the absorption factor in terms of 2 variables. The tables are analogous to the standard ones for cylinders.

12094* The Diffraction of X-Rays by a Random Assemblage of Molecules Having Partial Alignment. (English.) Herbert D. Deas. *Acta Crystallographica,* v. 5, July 1952, p. 542-546.

The medium considered consists of molecules or other like

16. *Apparatus, Methods, and Standards*

particles. The intensity distribution for x-ray diffraction is expressed in Fourier space in terms of the intensity distribution (Patterson transform) of the single molecule. Two examples are given, one of which contains, as a special case, the previously determined effect of finite linear gratings in random orientation.

12095* A Graphical Method for Applying Harker-Kasper Inequalities to Structure Determination. (English.) Kiichi Sakurai. *Acta Crystallographica*, v. 5, July 1952, p. 546-548.

Gives details of calculations and graphical interpretation of above method.

12096* The Rapid Solution of Cubic Equations. R. Hadekel. *Aircraft Engineering*, v. 24, July 1952, p. 206-207.

Describes method for engineers, using a nomogram and successive approximations.

12097 Rapid Method for Measuring Diffusion Coefficients for Solutions. F. T. Wall, P. F. Grieger, and C. W. Childers. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3562-3567.

Apparatus diagram, tables, and graphs.

12098 On Viscosity Measurement in the Ultra-Centrifuge. H. K. Schachman and W. F. Harrington. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3965-3966.

Viscosity-measurement method by comparing sedimentation rates of macromolecules and particles, with and without an additive. Tables.

12099 For Faster Non-Destructive Testing: Semi-Automatic X-Ray Equipment. David Goodman. *American Foundryman*, v. 22, Aug. 1952, p. 62-63.

Tells how the use of semi-automatic x-ray units coupled with automatic film developers makes speed and quality compatible. Illustrated.

12100 Optical Comparators Simplify Inspection of Turbine Buckets. *American Machinst*, v. 96, Aug. 4, 1952, p. 104-107.

Describes and discusses the above. Illustrated.

12101* Discharge Measurements by Means of Cylindrical Nozzles. A. L. Jorissen and H. T. Newton. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 825-835.

Detailed discussion of the above. Numerous graphs and tables.

12102* Linear-Resistance Meters for Liquid Flow. R. C. Souers and R. C. Binder. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 837-840.

An investigation was made of linear flowmeters with Cu-wool and brass-screen disk elements; the fluid was water. Test covered a range of plug lengths and specific weights. Graphs.

12103* How To Obtain Instrument Accuracy With Proportioning Pumps. J. N. Swarr. *Tranactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 891-895; disc., p. 895-903.

Tells how to use above pumps as flow-rate controllers. Relationships between factors involved are developed theoretically and tests are developed to enable the engineer to predetermine the suitability of proposed installations.

12104* Discharge Coefficients of Herschel-Type Venturi Tubes. A. L. Jorissen. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 905-909; disc., p. 909-913.

An analysis was made of a large number of calibration curves of above tubes, in order to obtain average values of coefficient of discharge, both in the range of constant coefficient and of coefficient varying with Reynolds number. Data furnished by American practice were compared with foreign standards of flow measurement. Graphs.

12105* Orifice and Flow Coefficients in Pulsating Flow. N. A. Hall. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 925-928; disc., p. 928-929.

The flow equations pertaining to the behavior of a fluid passing through an orifice are set forth so as to relate the flow coefficient to the orifice configuration and to flow losses. General nature of the flow coefficient is developed both for the case of instantaneous flow and pressure differences and for mean flow and pressure difference. 17 ref.

12106* Contributions to Hydraulic Control. I. Steady-State Axial Forces on Control-Valve Pistons. 2. Transient-Flow Forces and Valve Instability. Shih-Ying Lee and J. F. Blackburn. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p, 1005-1016, disc., p. 1009-1011.

In Part 1, a theory is given of the origin of the steady-state force exerted upon a piston by fluid flowing past its corner. Brief reference is made to experimental evidence in support of that theory, and a practical valve construction is described which very nearly eliminates that force. In Part 2, an outline is presented of a theory of a transient force which is one likely cause of oscillation of control valves, with supporting experimental evidence and methods of eliminating it. Graphs and diagrams.

12107* Measurement of Dynamic Shear Viscosity and Stiffness of Viscous Liquids by Means of Traveling Torsional Waves. H. J. McSkimin. *Journal of the Acoustical Society of America*, v. 24, July 1952, p. 355-365.

Data for polyisobutylene liquids with static viscosities up to 2000 poises are given for the range 25-150 kc. High-frequency data (5-25mc) for the same liquids are correlated. Some results for polypropylene, polyisoprene, polybutadiene, and polypropylene sebacate are also given. Graphs, circuit diagrams, and tables.

12108* The Reciprocity Calibration of Piezoelectric Accelerometers. Mark Harrison, A. O. Sykes, and Paul G. Marcotte. *Journal of the Acoustical Society of America*, v. 24, July 1952, p. 384-389.

2 piezoelectric accelerometers were calibrated by an absolute reciprocity technique in the frequency range from 100 cps. to 10 kc. A theoretical and experimental evaluation of the technique is given. Graphs and circuit diagrams.

12109 A New Apparatus for Studying the Evaporation of Water Monolayers. F. Sebba and N. Sutin. *Journal of the Chemical Society*, July 1952, p. 2513-2516.

Describes and diagrams apparatus. Typical results are charted and discussed.

12110* The Whirlwind I Computer. R. R. Everett. *Electrical Engineering*, v. 71, Aug. 1952, p. 681-686.

Characteristics of above computer are presented along with conemplated improvements. A list of some of the actual problems handled is also included.

12111* Designing Thermostat Systems. F. F. Yanikoski. *Electrical Manufacturing*, v. 50, Aug. 1952, p. 97-101, 282, 284, 286, 288, 290.

Discusses thermostat design and its relation to the heater system. Temperature-gradient concept is treated as an important design factor. Numerous graphs, tables, and diagrams.

12112 Interference Filters In Optics. K. M. Greenland. *Endeavour*, v. 11, July 1952, p. 143-148.

Illustrated review with 30 ref.

12113* Torquemeter for Indusrial Applications. R. B. Sims and A. D. Morley. *Engineering*, v. 174, July 4, 1952, p. 20-21; July 11, 1952, p. 36-38.

Describes and diagrams two torquemeters for use on shafts up to 11 in. in diam. Second installment tells how to seal electrical-resistance strain gages in the torquemeter against water, steam, and oil. Details of calculations are also given.

12114* The Measurement of Non-Electrical Quantities. G. von Basel. *Engineers' Digest*, v. 13, July 1952, p. 219-222. (A condensation.)

Reviews various methods for above. Describes a transducer or pick-up arrangement and a special transmission element which enables signals from transducers on rotating parts to be transmitted inductively to stationary elements without using slip rings. Various designs developed include a 4-mm strain-measuring element as well as torque meters, torsional vibration indicators, and dynamic pressure pickups. Diagrams.

12115* Study of Platinum—Platinum-Rhodium Thermocouples, and Their Industrial Application. (French.) Marcel Chaussain. *Fonderie*, June 1952, p. 2955-2970.

Discusses progress made in the above thermocouples. Methods for testing Pt wires, their contamination, and their applications in industry for determining temperature of molten steel are described. Tables, graphs, diagrams, and illustrations.

12116* Grinding Wheel Hardness and Its Measurement. W. Spaeth. *Industrial Diamond Review*, new ser., v. 12, July 1952, p. 141-143.

Describes and discusses various methods for the above. Illustrated.

12117* An Automatically-Controlled Knudsen-Type Vacuum Gauge. C. N. W. Litting and W. K. Taylor. *Proceedings of the Institute of Electrical Engineers*, v. 99, pt. 4, July 1952, p. 241-249.

A vacuum gauge of the Knudsen type is described, by which pressures from 10^{-5} mm. to 10 mm. Hg are indicated on a moving-coil instrument used in conjunction with a range-change switch. Principal units of the instrument control system are covered in detail and an overall analysis is developed. Graphs, schematic and circuit diagrams.

12118 Instrument Electronics. XI. Signal-Shaping Circuits. Milton H. Aronson. *Instruments*, v. 25, July 1952, p. 898-899, 926, 928, 930.

Basic circuits for shaping waves and signals include the modulator, demodulator, limiter, clamper, gater, counter, and phase shifter. Modulators and demodulators for amplitude, frequency, phase, and pulse-time modulation are discussed. (To be continued.)

12119* Visualization of Flow Fields by Use of a Tuft Grid Technique. John D. Bird. *Journal of the Aeronautical Sciences*, v. 19, July 1952, p. 481-485.

A technique for obtaining a physical picture of the flow field behind a wing, combination of wings, or other ariplane components is described wherein the action of a great number of tufts of uniform length, attached to a wire grid, are photographed from far downstream. This procedure yields, with a minimum of labor, an approximate vector plot of the flow field in a plane normal to the air stream. Examination of data obtained from application of this technique indicates its suitability.

12120 An Apparatus for the Direct Measurement of the Saturation Temperatures of Solutions. L. A. Dauncey and J. E. Still. *Journal of Applied Chemistry*, v. 2, July 1952, p. 399-404.

Eliminates need for waiting for equilibrium. Especially useful in construction of solubility curves, and in crystal growing.

12121 Specimen Charging in the Electron Miscroscope and Some Observations on the Size of Polystyrene Latex Particles. S. G. Ellis. *Journal of Applied Physics*, v. 23, July 1952, p. 728-732.

From observations in the shadow electron microscope and the standard electron microscope, it is concluded that specimen charging does not significantly change the magnification of the latter, provided that the specimen is less than a few microns in thickness and that the illuminating electron beam simultaneously strikes a nearby grounded conductor such as the supporting mesh. The difference in size of shadowed and unshadowed Dow Latex 580G, Lot 3584, reported by Kern and Kern, is attributed to an added layer of material on the shadowed particles. Evidence in support of this view is presented, and results of other workers are discussed in the light of it.

12122 The Reliability of Internal Standards for Calibrating Electron Microscopes. John H. L. Watson and William L. Grube. *Journal of Applied Physics*, v. 23, July 1952, p. 793-798.

Particles of Dow Latex 580G are unstable under electron beams and best micrographed at low intensity. Two different effects of radiation are noted. 580G is improved as an internal standard if recalibrated by some other suitable standard each time before use. Fresh replicas of diffraction gratings are still the most practical standards, reproducing gratings of 2%. A reliable method of calibration using 580G is suggested.

12123* Cellular Structure as Revealed by Ultraviolet Photolysis and the Electron Microscope. James W. Bartholomew and Tod Mittwer. *Journal of Bacteriology*, v. 64, July 1952, p. 1-5.

Exposure of cells in suspension, and as dried smears, to ultraviolet light was shown to result in an increased transparency to the electron beam. This resulted in revelation of various internal structures in bacterial and yeast cells. 14 ref.

12124* Size Determinations of Clay Particles in Water Suspensions by Use of Low-Angle X-Ray Diffraction. W. J. West. *Journal of Colloid Science*, v. 7, June 1952, p. 295-305.

Describes advantages of above procedure as compared with others. Particle-size determinations on several clays used as drilling fluids in the petroleum industry were made.

12125 A Sedimentation Balance for Particle Size Analysis in the Sub-Sieve Range. W. Bostock. *Journal of Scientific Instruments*, v. 29, July 1952, p. 209-211.

Apparatus diagram, graph, and tables.

12126 An Electronic Device for Measuring Small Transient Displacements. J. J. Trott. *Journal of Scientific Instruments*, v. 29, July 1952, p. 212-214.

Describes above for measuring displacements of magnitude down to 10 μin. Apparatus and circuit digrams and calibration curve.

12127 A Simple Hot Stage for the Study of Polarizing Microscope Interference Figures at Elevated Temperatures. E. G. Steward. *Journal of Scientific Instruments*, v. 29, July 1952, p. 214.

12128 The Pitot Cylinder as a Static Pressure Probe in Turbulent Flow. A. H. Glaser. *Journal of Scientific Instruments*, v. 29, July 1952, p. 219-221.

The pitot cylinder as described can be used where the variation of the angle of flow is no more than about 45°. With careful construction and testing, an accuracy of response within 1% of the dynamic pressure can be obtained. Graphs.

12129 Two Viscometers for Rapid Measurements at Definite Shearing Stresses. R. S. Higginbotham. *Journal of Scientific Instruments*, v. 29, July 1952, p. 221-224.

Two modifications of the cone-and-plate viscometer are described. The range of the first instrument is 1 to 100 poises at 10 dynes/cm^2, and 10-1000 poises at 100 dynes/cm^2; that of the second is 0.5-30 poises. Their accuracy is about ±5%. Diagrams and photographs.

12130 A Weissenberg X-Ray Diffraction Camera. C. A. Beevers. *Journal of Scientific Instruments*, v. 29, July 1952, p. 230-232.

A camera suitable for Weissenberg and other types of x-ray diffraction photographs is described. The special features are its simple and substantial construction, and the large diameter of filmholder and consequent large size of the photograph. The distance from focal spot to crystal is 100 mm. and thus exposure times are particularly short.

12131 A Photoelectric Balancing Device for Use With "Chainomatic"—Type Balances. P. W. Allen and R. D. Wright. *Journal of Scientific Instruments*, v. 29, July 1952, p. 235.

Describes above device which can follow weight changes of up to 10 mg. per min. with a precision of 1 mg.; thus it may be of general use wherever it is required to follow a weight changing with time.

12132 An Adjustable Debye-Scherrer X-Ray Camera for Specimens of Large Diameter. A. Taylor. *Journal of Scientific Instruments*, v. 29, July 1952, p. 236.

Describes 2 techniques, one for specimens up to ⅜ in., and the other, up to ¾ in. diam. Diagrams.

12133* A Method of Determining Friction Coefficients and Wear. (German.) Walter Kern. *Kautschuk und Gummi*, v. 5, June 1952, p. WT88-WT91.

Above method is based on the principle of friction of a rope over rolls, the friction coefficient being determined as a function of pressure, temperature, and friction base. Diagrams, tables, and graphs.

16. *Apparatus, Methods, and Standards*

12134 Designing Mechanical Computers. Part 2. Eugene W. Pike and Thomas R. Silverberg. *Machine Design*, v. 24, Aug. 1952, p. 159-163.

Presents mathematical solution for above problem.

12135* Nuclear Gaging Assures Precise Process Control. *Modern Machine Shop*, v. 25, Aug. 1952, p. 194, 196, 198, 200.

Gives details of equipment and procedures developed by Industrial Nucleonics Corp., Columbus, Ohio, for controlling thickness and density of adhesive, abrasive, and final adhesive coat with an accuracy within 1% at Carborundum Co., Niagara Falls, N. Y.

12136* Radiochemical Laboratories—Their Design and Layout. J. W. J. Fay. *Manufacturing Chemist and Manufacturing Perfumer*, v. 23, July 1952, p. 273-277.

Discusses the design and layout of equipment for a small radiochemical laboratory. Illustrated. 25 ref.

12137 Engineering Uses of Analog Computing Machines. C. B. Crumb, Jr. *Mechanical Engineering*, v. 74, Aug. 1952, p. 635-639.

Points out to engineers not familiar with computers how general-purpose analog computers fit into the over-all pattern of modern computing aids. This is done by brief, semitechnical descriptions of what these machines are and how they work; the kinds of problem that justify automatic computer treatment; and, within that category, the types of problem that should be handled by analog computers and those that should not. 14 ref .

12138 Powder Metallurgy as a Research Tool. H. W. Greenwood. *Metallurgia*, v. 46, July 1952, p. 8-10.

Discusses advantages of using powder-metallurgy methods in metallurgical research.

12139 Spring Failures and Their Causes. (Continued.) F. P. Zimmerli. *Metal Progress*, v. 62, July 1952, p. 84-88.

Concluding part of the 1951 William Park Woodside lecture entitled "Metallurgy in the Mechanical Spring Industry." Topics covered are: endurance vs. analysis (of carbon and alloy steel); surface defects; corrosion; setting or load loss (with data on carbon, alloy, and stainless steels, brass, and phosphor bronze); improper heat treatment; plating; phosphate coatings; and decarburization. Graphs.

12140 Testing Cemented Carbides. *Metal Progress*, v. 62, July 1952, p. 124, 126, 128, 148. (Condensed from "Methods of Testing Cemented Carbide Compositions" by A. D. Stevens and J. C. Redmond.)

Discusses chemical, physical, metallographic, and x-ray tests for inspection of the above. Tool failure, classification of the tools, and the need for more accurate description of them are also considered.

12141* Meeting on Modern Methods of Checking Dimensional Interchangeability. *Microtecnic* (English ed.), v. 6, No. 2, 1952, p. 69-147.

Comprises an address by M. F. Picard, conclusions by P. Nicolau, and the following papers: "Some Examples of the Application of Statistical Control in the Manufacture of Ball Bearings" (Translated from the French), G. Claesson; "Critical Study of Modern Methods of Statistical Control—New Control Methods", R. Cavé; "Preliminaries to the Application of Statistical Control Charts in the Automotive Industry", P. Pommier; "The Control of Quality on Mass-Produced Engineering Parts", J. Loxham; "Automatic Multiple Point Checking in Modern Mass Production", G. Bardet; and "The Use of Comparators for Production", R. Yribarren. Diagrams, tables, charts, and photographs.

12142 Gradient Methods in the Solution of Systems of Linear Equations. Marvin L. Stein. *Journal of Research of the National Bureau of Standards*, v. 48, June 1952, p. 407-413.

Results of various experiments with iterative methods for solving systems of linear algebraic equations are discussed. Modifications of the optimum gradient method are compared. 10 ref.

12143 Analysis of Goniophotometric Reflection Curves. Isadore Nimeroff. *Journal of Research of the National Bureau of Standards*, v. 48, June 1952, p. 441-448.

An established method of statistics is applied to the problem of goniophotometric-curve analysis and interpretation whereby such data are reduced to dispersion, skewness, and kurtosis indexes. The kurtosis index is shown to correlate better with subjective estimates of the distinctness of the reflected images than the conventional measure, 60° specular gloss. An application to glossimetry is given. Graphs and tables. 16 ref.

12144 Thermal Measurements on Small Transient Systems. R. A. W. Hill. *Nature*, v. 170, July 5, 1952, p. 29-30.

Experiments showed that it is practicable to heat the wires of a thermocouple by passage of an electric current and at the same time to record the temperature of the junction by means of the thermal emf. A high-frequency current is used in order that the concomitant voltage may be separated from the thermal emf. by means of inductance-capacitance filters. The apparatus can be used for measuring the thermal constants of poor conductors placed in contact with the couple wires. The method is very suitable for studying small transient systems such as exist in the reaction zones of thermal self-propagating reactions.

12145 Thin-Film Interferometric Techniques for High-Magnification Topographical Studies. S. Tolansky and M. Omar. *Nature*, v. 170, July 12, 1952, p. 81-82.

Describes a simple interferometric technique for examination of surface topography without the use of optical flats. The chief advantage is the possibility of using high magnification in extension across the surface without the use of a complex interference microscope. Illustrated.

12146 Microradiography With Alpha-Rays. Gunnar Aniansson and Naftali Steiger. *Nature*, v. 170, Aug. 2, 1952, p. 201-202.

Experiments were undertaken to determine potentialities and optimum conditions for the above. The main advantage of using α-particles as compared with soft x-rays is much simpler apparatus needed and relative independence of absorption on composition of the object.

12147* Solid and Liquid Scintillation Counters. George T. Reynolds. *Nucleonics*, v. 10, July 1952, p. 46-53.

A review, with emphasis on the energy response of scintillators on a consideration of the scintillation process. 37 ref.

12148* Remote Pipette Control for Radioactive Liquids. Ervin J. Liljegren and Stewart H. Webster. *Nucleonics*, v. 10, July 1952, p. 67-68.

Described and diagramed.

12149* A Method for Spectral Calibration of Photomultipliers at Low Intensity Levels. E. H. Gilmore and R. H. Knipe. *Journal of the Optical Society of America*, v. 42, July 1952, p. 481-483.

A MgO surface was used as an attenuator for direct calibration of photomultiplier tubes at low intensity levels. The photomultiplier response is compared with that of a thermopile by irradiating the photocathode with a constant fraction of the total radiation striking the thermopile receiver. Results are given for 3 tubes for the 2536-3663A. region. Standard deviation from the mean average 5%. 13 ref.

12150* Ordvac at Work. *Ordnance*, v. 37, July-Aug. 1952, p. 172-174.

Describes high-speed calculator which computes theoretical data on new weapons located at Aberdeen Proving Ground.

12151 Influence of the Apparatus Function on Crystallite Size Determinations With Geiger Counter Spectrometers. F. R. L. Schoening, J. N. van Niekerk, and R. A. W. Haul. *Proceedings of the Physical Society*, sec. B, v. 65, July 1, 1952, p. 528-535.

A brief survey of the various methods used for determining crystallite sizes from x-ray-diffraction line broadening is given. Experiments are described which illustrate the effect of sample preparation, absorption, etc., on measurements of line breadth. Graphs. 19 ref.

12152 The Torque Motor as a Control Device. Robert Kaplan and Albert J. Brotz. *Product Engineering*, v. 23, Aug. 1952, p. 119-123.

New interest is being shown in the torque motor as an actuator in control systems. Its advantages are: unlimited travel, either fast or cushioned operation, and a practically linear speed-torque characteristic. Tables, graphs, diagrams, and illustrations.

12153 Micro-Interferometry for Surface Measurements. R. E. Sugg. *Product Engineering*, v. 23, Aug. 1952, p. 156-157.

Describes and illustrates equipment, procedures, and typical results. Comparative photomicrographs and interferograms.

12154 Putting Ultrasonics to Work. Boyd Wise and Dale Ensminger. *Product Engineering*, v. 23, Aug. 1952, p. 180-185.

Surveys miscellaneous applications both in and above the sonic range, to locate flaws in metals, mix incompatible liquids, cut tough materials, and clean precision machined parts. Equipment and procedures are described, diagrammed, and illustrated. Includes glossary of ultrasonic terms.

12155 Upper Level Precession Photography and the Lorentz-Polarization Correction. Part I. Robinson D. Burbank. Part II. H. J. Grenville-Wells and S. C. Abrahams. *Review of Scientific Instruments*, v. 23, July 1952, p. 321-331.

Tells how the precession camera can be used to record the entire reciprocal lattice out to 1 rlu. using one-crystal orientation. The Lorentz polarization correction was computed to about 1300 points in reciprocal space. Part II consists largely of charts for this correction.

12156 Sodium Pump for Purification of Inert Atmospheres. LeRoy A. Bromley, Russell K. Edwards, and Raleigh L. McKisson. *Review of Scientific Instruments*, v. 23, July 1952, p. 342-344.

A liquid sodium pump and contacting tray are described and recommended for the removal of oxidizing gases from inert-atmosphere working chambers. With this apparatus, it is possible to obtain an atmosphere whose reactivity is less than the best vacuum in which comparable manipulations may be accomplished.

12157 A Precision Differential Manometer. G. J. Maslach. *Review of Scientific Instruments*, v. 23, July 1952, p. 367-369.

The requirements imposed by investigations of flow and heat-transfer characteristics of low-density gases were met by developing a precision manometer for measuring pressures between 0.05 and 20 mm Hg. The instrument makes use of optical elements to give the observer a clear magnified image of the meniscus.

12158 Evaporation of Silver From Electroplated Heating Elements. Lawrence A. Howard and Charles M. Berntson. *Review of Scientific Instruments*, v. 23, July 1952, p. 383.

Describes a method of holding silver for electrical melting in the evaporation of that metal onto surfaces of differing shapes and sizes.

12159 A New Device for Metallic Shadow-Casting. Tadatosi Hibi. *Review of Scientific Instruments*, v. 23, July 1952, p. 383-385.

A new device for metallic shadow-casting by using a nozzle system is proposed, and an outline of the apparatus is shown. Advantages of this system are discussed. Photomicrographs.

12160* Culture Chamber for the Microscopical Study of Living Bacteria With Some Observations on the Spore-Bearing Aerobes. Nora K. Harris and E. O. Powell. *Journal of the Royal Microscopical Society*, ser. 3, v. 71, June 1952, p. 407-420.

The chamber described consists essentially of a cellophane membrane on the upper surface of which micro-organisms are grown. Their nutrient medium is supplied to the lower surface of the membrane. The organism can be studied microscopically by vertical illumination. The gaseous and liquid environment can be changed at will while a single cell or small group is kept under observation. Micromanipulative techniques can be applied. Use of the chamber is exemplified. 10 ref.

12161* Histological Techniques for the Electron Microscope. M. S. C. Birbeck. *Journal of the Royal Microscopical Society*, ser. 3, v. 71, June 1952, p. 421-428.

A technique for cutting thin sections for the electron microscope is described. Adequate fixation of the tissue is one of the limiting factors. The tissue is fixed in osmium tetroxide, embedded in ester wax, and sectioned on a Cambridge rocking microtome. It has been used to examine various normal rat tissues. 14 ref.

12162 Colloidal Graphite in the Preparation of Samples for Gas-Flow Counting. Allen F. Reid and Margaret C. Robbins. *Science*, v. 116, Aug. 8, 1952, p. 148-149.

Describes improved results obtained upon incorporation of colloidal graphite in the samples.

12163* Optical Problems in High-Speed Camera Design. John C. Kudar. *Journal of the Society of Motion Picture and Television Engineers*, v. 58, June 1952, p. 487-490.

12164* Use of a Rotating-Drum Camera for Recording Impact Loading Deformations. D. F. Muster and E. G. Volterra. *Journal of the Society of Motion Picture and Television Engineers*, v. 59, July 1952, p. 44-48.

Details of above camera are described. It is used to record displacement-time data for short cylindrical specimens made of a rubberlike material which are subjected to compressive impact loadings lasting 5-20 millisec. Illustrated.

12165* Relation Between Air Permeability and Specific Surface of Powdered Substances. (German.) A. H. M. Andreasen and B. Nielsen. *Staub*, June 15, 1952, p. 139-144.

Describes and compares two different methods of determining specific surface of powders. Diagrams, graphs, tables, and photomicrograph.

12166 Optical Gaging Checks 41 Dimensions in 40 Seconds. *Steel*, v. 131, July 28, 1952, p. 78-79.

Describes accurate mechanical method of inspection for checking a rotor part of an artillery shell booster. Method uses 27 gages and one experienced man.

12167 Temperature Standardization: Big Gains in Research. R. E. Wilson. *Steel*, v. 131, Aug. 11, 1952, p. 90-92.

Work of National Bureau of Standards in extending its temperature standardization toward extremes of the temperature scale.

12168* On the Lamellar Reflectivity for Multiple Reflections. (English.) Shigenori Nawata. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Feb. 1951, p. 107-117.

A convenient expression for calculating the reflectivity of lamella with a single film on a base material is derived for the case of normal incidence, and reflection from multiple films on a basic material is solved, based upon the theory that this film is a hypothetical surface with an "effective refractive index".

12169* Measurement of the Thickness of Metal Plate by Ultrasonic Harmonic Method. II. Electronic Operation and Results of a Field Inspection. (English.) Sakae Tanaka. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 201-208.

After giving some notes on arrangements of the cricuit, construction of the apparatus is described. As a typical example determination of wall thickness of the penstock at an electric power plant was made and compared with direct readings obtained by drilling.

12170* Measurement of Viscosities of Gases at High Pressure. I. Viscosity of Air at 50°, 100° and 150°C. up to 200 Atmospheres. (English.) Hiroji Iwasaki. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 247-257.

Describes modified oscillating-disc viscometer constructed to study the viscosities of gases at high pressures over a wide range of temperatures, also a method for calculating viscosity from the experimental data. Results are given for viscosity of air at 50, 100 and 150°C. up to 200 atm. 35 ref.

16. *Apparatus, Methods, and Standards*

12171 Checking Analogue Computer Solutions. W. F. Richmond and B. D. Loveman. *Tele-Tech*, v. 11, Aug. 1952, p. 44-46, 86-87.

Dynamic substitution method is said to produce excellent results with substantial savings in time and material. New approach is applicable to simulation problems using actual equipment in connection with a computer. Graphs and diagrams.

12172 Knudsen Gauges. W. Steckelmacher. *Vacuum*, v. 1, Oct. 1951, p. 266-282.

A brief review of development and applications is followed by a detailed description of improved forms of metal and glass gages. Their performance with respect to factors such as outgassing, methods of suspension, extension of range by electromagnetic compensation, and damping are discussed. Schematic diagrams and graphs. 48 ref.

12173* Proposed Tentative Specifications for Brazing Filler Metals. *Welding Journal*, v. 31, Aug. 1952, p. 645-650.

Prepared by a subcommittee jointly sponsored by AWS and ASTM. Includes tables of chemical-composition requirements; standard forms and sizes; dimensional tolerances; and solidus, liquidus, and brazing-range temperatures. Outlines operating characteristics and usability of each class.

12174* Accurate Pyrometry and Furnace Control Pays at Douglas. *Western Machinery and Steel World*, v. 43, July 1952, p. 74-77.

Discusses the necessity of the above in proper heat treating of metals (especially Al), forming in heated dies, and curing of plastic parts to meet aircraft requirements. Considers the precise calibration of control instruments in this work at Santa Monica Div. of Douglas Aircraft Co. Illustrated.

12175* Control Technique. (German.) W. Husinger. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, July 1, 1952, p. 627-631.

Different instruments for controlling electrical magnitudes, revolutions, temperature, etc., are described and illustrated. 99 ref.

12176* An Auxiliary Apparatus for Measuring the Light Refractivity of Hygroscopic Powders. (German.) Ernst Kordes, Werner Vogel, and Bogislaw Rackow. *Zeitschrift für anorganische und allgemeine Chemie*, v. 268, nos. 4-6, 1952, p. 236-243.

Described, diagrammed, and illustrated.

Miscellaneous Publications

12177 Methods of Measuring High Temperatures in Gas Streams. E. R. Letsch and W. J. King. American Society of Mechanical Engineers, Paper 51-A-143, 1951, 15 pages. (TJ1 Am35p)

Reviews errors of above methods, and summarizes published literature on techniques developed to date. Procedures recommended for particular conditions. Table and equipment diagrams. 19 ref.

12178 Some Experiences Regarding the Nonlinearity of Hot Wires. R. Betchov and W. Welling. National Advisory Committee for Aeronautics, Technical Memorandum 1223, June 1952, 13 pages. (Translated from *Koninklijke Nederlandsche Akademie van Wetenschappen te Amsterdam, Verhandelingen*, v. 53, no. 4, 1950, p. 432-439) (TL570 Un3tm)

Compares experimental results with formulas established in a preceding report. Shows nonlinear term as important as thermal conduction in the calculation of thermal inertia of the hot wire. Circuit diagram and graphs.

12179 Nonlinear Theory of a Hot-Wire Anemometer. R. Betchov. National Advisory Committee for Aeronautics, Technical Memorandum 1346, July 1952, 23 pages. (Translated from *Koninklijke Nederlandsche Akademie van Wetenschappen te Amsterdam, Verhandelingen*, v. 52, no. 3, 1949, p. 195-207.) (TL570 Un3tm)

Theoretical analysis to determine the differences in resistance characteristics as given by King's equation for an infinite wire length and those given by specified additional considerations. Graphs.

12180 A High-Precision Analog-to-Digital Converter. Bernard Lippel. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 206-215. (TK161 N21p.)

Describes encoder for sampling repeatedly the orientation of a shaft and generation of succession of 15-digit binary numbers which are accurate measures of the sampled shaft angles. The device employs a glass disk onto which a special code pattern has been copied photographically. The "cyclic progression code" is used to avoid transition problems. The glass disk is coupled directly to the input shaft and rotates past a stationary reading system which includes a fine radial slit, a high-intensity stroboscopic light, and 15 photocells. A parallel translator transforms the numbers to conventional binary code.

12181 Photoformer Design and Performance. Earl J. Hancock. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 228-234. (TK161 N21p.)

Many of the advances in the applications of high-speed electrical analog computing machines will be made in the treatment of ordinary nonlinear differential equations. Function-forming equipment is becoming of increasing importance. Continuing development of the Photoformer seems essential for treatment of more complicated functions. Presents quantitative design details and performance characteristics. Engineering problems are reported on to illustrate use of the device in representation of double-valued as well as complicated single-valued functions.

12182 High-Speed Inspection of Canned and Packaged Products Using Solid X-Ray Detectors. John F. Howell. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 337-340. (TK161 N21p)

12183 Theory and Operation of the Electrostereoscope. D. J. Gimpe. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 369-377. (TK161 N21p)

Device designed to facilitate and simplify the presentation for analysis of data from large-scale analog computing machines.

12184 Multi-Stable Magnetic Memory Systems. John D. Goodell and Tenny Lode. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 378-379. (TK161 N21p)

Several basic techniques for handling information, translating from one type of presentation to another, and storing information in magnetic materials capable of a multiplicity of stable states are described. A system for handling and storing information using a code related to an amplitude or time base by means of special magnetic-storage techniques is discussed.

12185 A Magnetic Recorder for Medical Application. J. L. Murphy and H. W. Pavela. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 424-432. (TK161 N21p)

Problems encountered during development of a recorder utilizing a commercial transport mechanism and recording heads, together with their solutions, are described, with particular emphasis on the equalization problem for best reproduction of the spiked waveforms encountered in electromyography recording. Design of the recording and playback amplifiers is described in detail, and results are presented in the form of square-wave response and frequency-response data.

12186 The Application of a 60-Cycle Magnetic Amplifier to a Position Indicating Servomechanism. Albert E. Schmid. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 515-522. (TK161 N21p)

A servo system, designed at Naval Ordnance Laboratory, which is a typical 60-cycle magnetic amplifier, is described. Detailed operation of the single half-wave, self-saturating, magnetic amplifier is discussed and related to operation of the push-pull amplifier. Current oscillograms are shown. Servo performance is compared with that using a vacuum-tube amplifier. 10 ref.

12187 Electric Strain Gage Field Analysis of a Foundation Structure. J. C. Ascherman. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 125-132. (TG265 So13p)

Reports methods and techniques used in application and waterproofing of Baldwin SR-4 type strain gages, for a recent field investigation which required strain measurements within vertical water-filled cylinders 160-170 ft. long. In addition, a simple method is described for retaining the desired sensitivity in an SR-4 Portable Strain Indicator (Type K) when lead-in wires

200 ft. and more in length are used. The methods were evolved and used under severe tropical field conditions.

12188 Design of Differential Transformer Displacement Gauges. A. G. Boggis. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 171-184. (TG265 So13p)

Diagrams, graphs, and illustrations.

Books

12189 Sampling Inspection by Variables. Albert H. Bowker and Henry P. Goode. 216 pages. 1952. McGraw-Hill, New York. (QA276.5 B67s)

Presents a set of plans for sampling inspection where item quality is expressed on a variable basis. In general, these sampling plans and the procedures for their use were developed for the needs of acceptance inspection of raw materials, semi-finished parts, or completed products.

12190 Modern Interferometers. C. Candler. 502 pages. 1951. Hilger & Watts, Ltd. (Printed by University Press, Glasgow, Scotland.) (QC411 C16m)

Deals with instruments and their uses, and with essential theory. Within this limited field, the book is comprehensive, covering instruments used in industry, in the standardizing laboratory, and in academic research. Also covers the diffraction grating.

12191 Statistical Theory With Engineering Applications. Statistical Tables and Formulas. A. Hald. 783 and 97 pages. 1952. John Wiley & Sons, Inc., New York. (QA276 H12s)

A slightly expanded version of a Danish textbook, published in 1948, which was written on the basis of lectures given to members of the Danish Society of Civil Engineers. Aim is to provide a fairly elementary mathematical treatment of statistical methods of importance to the engineer. Includes supplement as indicated above.

12192 Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry. 48 pages. 1951. Instruments Publishing Co., Pittsburgh. (TA165 C76p)

Papers presented at conference held in Pittsburgh, Mar. 28-29, 1951: "Non-Contact Gaging", J. T. Welch; "An Electronic Control System for Industrial Control Applications", Elwood T. Davis; "Measurement and Control in the Utilization of Mixed Fuels and Oxygen in Open Hearth Furnaces", Martin J. Conway and Edward H. Cauger; "Hydraulic Servocontrols in the Steel Industry", H. Ziebolz; "Pneumatic Servomechanisms in the Iron and Steel Industry", A. A. Markson; "Radiographic Inspection of Steel Castings", J. N. Flanagan; "Methods for Sorting Mixed Metals", Antony Doschek; "Comparison of Methods for Measuring Temperature of Molten Metals", J. W. Percy; "A Thermocouple System for Molten-Metal Temperature Measurement", Lester Veiock; "Radiation Pyrometers Control New High-Gradient Heating Process", H. W. Cox; and "Instrumentation Minimizes the Welding Variable", Julius Heuschkel.

See also:

11678 (width gage for hot-rolling mills)
11718 (analysis and testing of metal powders)
11734 (military aeronautical welding specifications)
11735 (military specifications for resistance welding)
11797 (specifications for electro-deposited coatings)
12227 (high-speed camera for combustion problems)
12378 (quality-control methods)
12580 (castable polyester resin for photoelastic work)
12730 (nozzle characteristics in high-vacuum flow)
12731 (measuring pulsating flow)
12801 (vacuum gages and production of high vacua)
12809 (semiconductors as x-ray detectors)
12849 (electronic analog-computer fundamentals)
12850 (data-displaying cathode-ray tube)
12969 (toolsteel specifications—France)
12972 (steel for sheet and strip)

17. METALS—FABRICATION AND USES

12193* The Rotary Cutting Tool. M. C. Shaw, P. A. Smith, and N. H. Cook. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 1065-1073; disc., p. 1073-1076.

An unusual lathe-type cutting tool in the form of a disk that may be rotated about its central axis is described and analyzed. Representative test data for both rotary and stationary tools are discussed. Schematic drawings, charts, and photographs.

12194* S. S. United States. *Architectural Forum*, v. 97, July 1952, p. 119-125.

Describes and illustrates new architectural features of above, including extensive use of Al and its alloys.

12195 Metals and Metal Processing in the Atomic Energy Field. Alan U. Seybolt. *Combustion*, v. 24, July 1952, p. 47-50.

Outlines some properties of a few of the "newer" metals of more or less interest in the atomic energy program and describes some of the processes used in manufacturing or fabricating these metals. Zr, Be, and Na are discussed at length. Processes of melting and casting, fabrication, welding, and powder metallurgy are considered.

12196* Economic Limits to the Use of Cast Aluminum in Automobile Construction. (German.) K. Schneider. *Giesserei*, v. 39, June 2, 1952, p. 309-311.

Compares costs for various parts in cast iron and aluminum. Technical considerations, such as weight of the vehicle, gasoline consumption, and various advantages of aluminum as compared to gray iron are outlined. Tables contain comparisons of costs and weights.

12197 New Beds for Rivers of Molten Metal. *Inco Magazine*, v. 25, no. 3, 1952, p. 9.

Ductile-iron troughs resist attack of molten Al much better than the gray iron previously used to transfer the metal from holding ladles to multiple casting units.

12198 Magnesium in the 1952 Automobiles. *Magazine of Magnesium*, Aug. 1952, p. 1-3.

Describes and illustrates applications in 1952 Chrysler cars for 16 die- and permanent-mold-cast parts.

12199 A Survey of High-Temperature Materials. J. M. Robertson. *Metal Treatment and Drop Forging*, v. 19, July 1952, p. 303-312.

Deals with alloys used in steam and gas-turbine plants operating in the 450-950°C. range, with attendant problems of both ferritic and austenitic steels and other alloys. Compositions of 43 alloys in 9 type groups are tabulated.

12200 Economy in Steel Alloying Elements; Guide to Alloy Steel Direction. *Metallurgia*, v. 46, July 1952, p. 31-32.

Guide to use of a new British government directive.

12201 Applications of Copper-Clad Aluminum. *Metallurgia*, v. 46, July 1952, p. 39-40.

Available forms and applications of German product named "Cupal".

12202 Titanium: Expensive Weight Saver. *SAE Journal*, v. 60, Aug. 1952, p. 25-30. (Based on "Application of Titanium to Aircraft Engines", by H. H. Hanink.)

Presents comparative mechanical-property data for Ti and other metals. Discusses relative merits for different jet and piston-engine applications. Higher costs are balanced against weight savings for Ti and its alloys. Mechanical-property limitations and advantages are critically discussed.

12203* Ryan Alloy For Exhaust Systems Resists Scaling at 1800° Temperatures. Henry Berlinghof, Jr. *Western Metals*, v. 10, July 1952, p. 42-43.

Pescribes development of "Rynalloy" to insure the proper functioning of the ball-and-socket joints in Army personnel carriers. Composition is not given. These assemblies are used to provide flexible exhaust-gas connections between the power plant and the chassis.

Miscellaneous Publications

12204 Recuperators of Alloy Steel. K. Rummel. Henry Brutcher, Translation 110 (Reissue), 10 pages. (From *Stahl und Eisen*, v. 52, no. 23, 1932, p. 559-562.)

Superiority of recuperators made of heat-resisting steel over

17. *Metals—Fabrication and Uses*

brick. Advantages of preheating temperatures of up to 1650°F. for rolling-mill, forge-shop, and heat-treating furnaces of steelworks and for other industries. Possible savings on fuel: 20-30%. Economy of alloy-steel recuperators in other respects. Specific examples of performance.

See also:
11661 (Be-Cu cavities for die castings)
11663 (automotive applications of Mg)
11702 (applications of stainless steel)
11875 (Ge in electronics industry)
11886 (Mn-Bi permanent-magnet material)
11928 (Mg-alloy truck wheels)
11953 (applications of Hastelloy B)
12926 (duralumin printing-plate mounts)
12959 (atomic radiation effect on metals)
12972 (steel for sheet and strip)

18. POLLUTION AND WASTES

12205* A Scientist Views the Air Pollution Problem. H. H. Schrenk. *Air Repair*, v. 2, Aug. 1952, p. 17, 18, 20.

General discussion of above problem. Considers causes, health effects, air sampling and interpretation, and other related factors.

12206* The Role of the Bureau of Industrial Hygiene in Air Pollution Control in Pennsylvania. Joseph Shilen, J. S. Sharrah, and Charles D. Robson. *Air Repair*, v. 2, Aug. 1952, p. 23-27.

Discusses the organization and work of above bureau whose main function is investigation and evaluation of air-pollution problems arising from industrial sources. Specific testing techniques are considered. Illustrated.

12207* Chaos Versus Planning in Industrial Air Pollution. Frederick G. Sawyer and William E. Rand. *Air Repair*, v. 2, Aug. 1952, p. 44-46.

Discusses air pollution, stressing the role of the pollution expert.

12208* A Mobile Method for Measuring Atmospheric Diffusion. J. D. Sartor, I. Katz, and R. E. Katz. *Bulletin of the American Meteorological Society*, v. 33, May 1952, p. 188-194.

A portable method of measuring diffusion consists of lifting smoke-puff generators with tethered balloons, setting off puffs remotely, and photographing them with two motion-picture cameras. From the resulting records of areal spread of smoke and distance of travel, one may compute values of diffusion coefficients. Preliminary experiments yield data in accord with those published by Sutton. 11 ref.

12209* Instrumentation and Methods for Testing Radioactive Contamination in Water. *Journal, American Water Works Association*, v. 44, July 1952, p. 583-592; disc. p. 592-594.

Photographs and calibration curves. 22 ref.

12210* Measuring Processes and Devices for Determination of Dust in Flowing Gas Streams. (German.) P. Noss. *Brennstoff-Wärme-Kraft*, v. 4, July 1952, p. 227-232.

Reports on an investigation of the above conducted to develop a standard method and equipment for dust determination in gas, also for determining the grain size and chemical composition of such dust. Various types of equipment and methods are compared; preliminary results of the investigation are indicated. Diagrams.

12211* Some Recent Advances in Homogeneous Aerosols. Victor K. Lamer and Pierre R. Gendron. *Chemistry in Canada*, v. 4, Apr. 1952, p. 44-46.

Reviews methods of production, measurement of particle size, and uses. Toxicity of DDT aerosols follows the law of deposition of aerosols on geometrical objects as calculated by Sell. This deposition is an inverse exponential function of distance from the source. 13 ref.

12212* Sure Methods for Disposing Food Wastes. W. Rudolfs and H. Heukelekian. *Food Engineering*, v. 24, Aug. 1952, p. 104-116.

Special report on problems of brewers, canners, citrus processors, confectioners, corn-products makers, dairymen, meat packers, poultry packers, sugar-beet refiners, wine makers, and others. 13 ref.

12213 Operation, Application, and Effectiveness of Dust Collection Equipment. John M. Kane. *Heating and Ventilating*, v. 49, Aug. 1952, p. 87-98.

Practical information to help select the type of dust-collector equipment most suitable for a specific application. Schematic diagrams and graphs.

12214 Atmospheric Pollution. Louis C. McCabe. *Industrial and Enginering Chemistry*, v. 44, Aug. 1952, p. 105A-107A.

Installations of fog-filter units and an asphalt-oxidizer fume-disposal system are described in a new report on scrubbing devices for air pollution control.

12215* Open Hearth Dust Control. Stephen Vajda. *Iron and Steel Engineer*, v. 29, July 1952, p. 111-119; disc., p. 119-120.

Discusses the 6 basic types of gas-cleaning units available for the above. A test experiment on each is described. Illustrated.

12216 A Recording Dust Meter. B. O. Smith and S. S. Carlisle. *Journal of the Iron and Steel Institute*, v. 171, July 1952, p. 273-276.

The instrument described gives a continuous record which, generally, is a qualitative measure of the dust level. It uses a light-scattering technique in which a photoelectric cell measures the light scattered by dust particles in a direction normal to the illuminating beam. The scattered light flux, inferred from the photocell current, is taken as a measure of dust concentration. Also discusses results obtained in a series of trials on blast-furnace gas. Graphs, drawings, and circuit diagram. 11 ref.

12217 Bench-Scale Method for Treating Waste by Activated Sludge. Richard H. Coe. *Petroleum Processing*, v. 7, Aug. 1952, p. 1128-1132.

Continuous rather than batch technique shows process has advantages in cutting refinery effluent contamination. Describes apparatus, procedure, and effects of various factors. Data charted and tabulated.

12218* Regularity in the Degree of Stepwise Dust Removal. (German.) Eckert. *Staub*, June 15, 1952, p. 145-147.

Enumerates conditions which influence above and shows that increase in efficiency with increasing grain size can be expressed in form of a mathematical equation. Nomogram.

12219 Wet Dust Recovery: Big Tonnage Returns. Martin L. Cover. *Steel*, v. 131, Aug. 11, 1952, p. 98, 101-102, 104, 106, 109.

Tells how wet dust from blast furnaces is recovered in the form of sludge, made into filter cake, and recharged as sinter. Layout for wet-flue-dust recovery plant is presented and discussed.

12220* City Air-Pollution Report Released. Richard G. Tyler. *Trend in Engineering at the University of Washington*, v. 4, July 1952, p. 7, 27-28.

Brief summary of findings of Seattle investigation.

Miscellaneous Publications

12221 The Treatment of Pulp and Paper Mill Effluents. A. B. Horlock, R. D. Isabell, and R. S. Jobin. *Proceedings of the Technical Section, British Paper and Board Makers' Association*, v. 33, Feb. 1952, pt. 1, p. 115-137; disc., p. 81-93, 138-146. (TS1080 P19p)

Discusses above, dealing especially with removal of suspended solids, reduction of biological oxygen demand, and some legal aspects. 11 ref.

See also:
12255 (spreader stokers vs. air pollution)
12395 (industrial waste treatment)
12953 (water-pollution problems)

19. FUEL TECHNOLOGY

12222 Hydrocarbon Burning Velocities Predicted by Thermal Versus Diffusional Mechanisms. P. L. Walker, Jr. and C. C. Wright. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3769-3771.

Maximum burning velocities for 36 hydrocarbon-air mixtures are predicted by equation of Semenov and compared with experimental velocities and those predicted by Tanford and Pease diffusional equations. Table and graph. 10 ref.

12223* Thermodynamics of Gasification of Coal With Oxygen and Steam; Charts for Material and Enthalpy Balance Calculations. Wayne C. Edmister, Harry Perry, R. C. Corey, and M. A. Elliott. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 621-634; disc., 634-636.

12224 Looking Ahead With Conventional Fuels. David D. Moore. *Battelle Technical Review*, v. 1, July 1952, p. 77-78.

Discusses present status and future prospects for increased use of natural gas, petroleum research, and synthetic liquid fuels.

12225 Nomograph for Combustion Control. J. F. Voorwijk. *Chemical Engineering*, v. 59, July 1952, p. 216-217.

Nomograph and illustrative examples for finding maximum % CO_2 and % excess air, based on flue-gas analysis.

12226* Mineral Constituents of Coal. R. S. Brown, R. L. Caldwell, and F. Fereday. *Fuel*, v. 31, July 1952, p. 261-273.

Claims that the best method for estimating the mineral content of coal is that of King, Maries, and Crossley: it involves determination in the laboratory of ash, pyritic sulfur, CO_2, sulfate in ash, sulfate in coal, and chlorine. Shows that 6 quantities are interrelated, hence estimation of mineral content can be based on determination of fewer than 6 quantities. A formula based on ash, total S and CO_2 was investigated.

12227* Design and Construction of a High Speed Camera and Its Application to Certain Combustion Problems. A. H. Howland and M. J. G. Wilson. *Fuel*, v. 31, July 1952, 274-287.

Describes a schlieren camera and the associated spark light source capable of taking photographs up to a speed of 10,000 frames per sec. Some preliminary results are given of application of this camera in study of oscillation of the inner cone of a "roaring" bunsen burner flame and explosive combustion occurring in tunnel burners. 10 ref.

12228* Reactivity of Cokes. H. L. Weisz and A. A. Orning. *Fuel*, v. 31, July 1952, p. 288-301.

Reactivity indices based on self-heating rates were determined for 122 cokes in air and 92 cokes in oxygen. Cokes of similar volatile matter content produced from the same coal by different carbonization procedures were included. Quantitative relations were found between dry, ash-free volatile matter content and reactivity indices. Attempts were made to determine dependence of self-heating rates on physical structure, but only qualitative results were obtained. Effect of pore-surface distribution was found to be significant but small as compared to influence of nature of the solid. 13 ref.

12229* Separation of Coals Into Fractions of Different Densities. L. Horton. *Fuel*, v. 31, July 1952, p. 341-354.

Finely divided, clean bright coals, or, where possible, vitrains were fractionated. At a point in the scale of rank between 84.6 and 88.6% C content, coals possess a minimum density. It is believed that this point marks the onset of a significant change in the mode of maturing of the coal substance.

12230* Physics of Fuel Bed Combustion. M. W. Thiring. *Fuel*, v. 31, July 1952, p. 355-364.

An attempt is made to calculate absolute values of reaction rates in fuel beds assuming that physical rather than chemical factors decide these reaction rates. 10 ref.

12231* Behaviour of Sulphur Dioxide in Carbon Monoxide Flames. G. Whittingham. *Fuel*, v. 31, July 1952, p. 382-383.

Gives a brief account of further work in which the behavior of SO_2 in premixed CO-air flames is compared with that in normal and reversed diffusion flames.

12232* The Control of Pressure Conditions Within the Retort. A. R. Myhill. *Gas Times*, v. 72, July 11, 1952, p. 47-48, 51.

Discussion of the above includes automatic regulation, retort house governors, dry main system, porosity of refractories, inleakage, relay governors, layout design, and governor problems.

12233* The Effect of Coal Characteristics on Boiler Performances. D. C. Gunn. *Journal of the Institute of Fuel*, v. 25, July 1952, p. 148-155.

A short survey of past work is followed by a statement of the need for further investigations to cover present conditions. An experimental boiler plant is described in which such work was carried out. A preliminary investigation, involving 8 coals covering a wide range of rank but all of low ash content, is outlined. Results expressed as boiler efficiency are tabulated and show that, whereas rank seems to be of little significance in its effect on efficiencies, the presence of fines is very important. 14 ref.

12234* A Special Study of Ash and Clinker in Industry. *Journal of the Institute of Fuel*, v. 25, July 1952, p. 166-188.

Series of papers prepared for a conference to be held in London, Oct. 28-29, 1952: "Origin and Nature of Ash; Sampling and Analysis", L. J. Edgcombe and A. B. Manning; "The Mineral Matter in Coal and Its Relation to Coal-Preparation Problems", Arthur Grounds and A. M. Wandless; "Ash and Atmospheric Pollution", A. Fitton; "The Influence of Ash on the Operation of Gas Producers in the Gas Industry", L. G. Townsend; "Ash and the Coal-Fired Gas Turbine", T. F. Hurley; and "Considerations on the Effect of Ash and Clinker in the Iron and Steel Industry."

12235* Some Experiments on the Influence of a Solid Phase on the Oxidation of Low Viscosity Mineral Oil. D. J. W. Kreulen. *Journal of the Institute of Petroleum*, v. 38, June 1952, p. 445-448.

Presence of a solid phase affects both length of the induction period and rate of oxidation of mineral oil. Besides glass, other solids such as sand, anthracite, retort carbon, and SiC are effective. Experiments with glass, quartz, and sand point to a decreasing catalytic effect of the solid phase when its chemical resistance increases.

12236* The Influence of Zinc Oxide Smokes on the Oxidation of Sulphur Dioxide in Coal-Gas Flames. R. F. Littlejohn. *Journal of Applied Chemistry*, v. 2, June 1952, p. 289-294.

Measurements on filtered and unfiltered gases show the presence of smoke tends, at first, to increase the amount of oxidation of dioxide to trioxide, but if sufficient smoke is present, the trioxide formed is absorbed and $ZnSO_4$ is formed.

12237* The Oxidation of Carbon by Air. I. Catalysis in the Oxidation of Carbon Black by Air. Saul Patai, E. Hoffmann, and L. Rajbenbach. **The Oxidation of Carbon by Air. II. Catalytic Effects in the Oxidation of Graphite, Nuchar and Sugar Charcoal by Air.** Saul Patai, L. Rajbenbach, and E. Hoffmann. *Journal of Applied Chemistry*, v. 2, June 1952, p. 306-314.

In Part I, oxidation of carbon black by air in a closed system was studied at 367°C. in the presence of 10 different potassium salts, and of the chlorides of 6 different metals. An explanation is presented for the catalytic action of halogenides. In Part II, oxidation by air of graphite, nuchar, and sugar charcoal was studied in the presence of different catalysts. All reactions were found to follow overall 2nd-order kinetics. 25 ref.

12238 On the Validity of Spectroscopic Temperature Determinations in Flames. Kurt E. Shuler. *Journal of Applied Physics*, v. 20, July 1952, p. 1176-1177.

Shuler's reply to communication from S. S. Penner. (See abstract below.)

12239 On the Validity of Anomalous Population Temperatures in Flames. S. S. Penner. *Journal of Applied Physics*, v. 20, July 1952, p. 1175-1176.

On the basis of present knowledge and results of calculations the author does not feel that he can accept Shuler's "anomalous" fibrational temperatures as valid experimental evidence without convincing proof that all necessary corrections for temperature gradients in the field of view have been applied, preferably by use of the methods of Cowan and Dieke and a

19. *Fuel Technology*

quantitative demonstration, using the absolute intensity estimates of Oldenberg and Rieke, that effects of self-absorption do not produce significant distortion of the experimental data. 11 ref.

12240 Here's How to Run Octane Ratings With 20-40 Ml. Samples. R. F. Galloway. *Petroleum Processing*, v. 7, July 1952, p. 970-972.

Describes a micro method for octane-number determination developed in Magnolia Laboratories, Beaumont, Texas. It uses the standard carburetor system with only minor modifications. Diagram and photographs.

12241 Spectra of Flames Supported by Free Atoms. A. G. Gaydon and H. G. Wolfhard. *Proceedings of the Royal Society*, ser. A, v. 213, July 8, 1952, p. 366-379.

The spectra of the atomic flames of organic compounds with the products of discharges through O_2, H_2, and H_2O vapor were examined. The mechanism of formation and excitation of Ch and OH in flames is discussed. 14 ref.

12242* Engine Deposits Create Fireworks. *SAE Journal*, v. 60, July 1952, p. 37-43; disc., p. 43-44. (Excerpts from "Flame Photographs of Autoignition Induced by Combustion Chamber Deposits", by L. L. Withrow and F. W. Bowditch. To be published in full in *SAE Quarterly Transactions.*)

Flame photographs of above deposits taken with highspeed motion-picture cameras show that the purging action sometimes produces incandescent particles or surface areas capable of inducing autoignition. This problem is discussed. Numerous photographs of engine explosions.

Miscellaneous Publications

12243 The Effect of High Frequency Sound Waves on an Air-Propane Flame. Charles J. Kippenhan and H. O. Croft. American Society of Mechanical Engineers, Paper 51-A-112, 1951, 10 pages. (TJ1 Am35p)

A study of the influence of high-frequency sound waves of considerable intensity on the combustion process and in particular the effect on normal flame velocity. Apparatus diagrams, photographs, and graph.

12244 Preparation, Classification, and Efficient Usage of Coal. J. N. Williams. *Proceedings of the Technical Section, British Paper and Board Makers' Association*, v. 33, Feb. 1952, pt. 1, p. 1-24; disc., p. 25-27. (TS1080 P19p)

Deals with methods employed in preparation of coal; handling of fine coals; influences of sizing and segregation upon combustion efficiency; and effect of adding moisture to slacks. Discusses overheating and spontaneous combustion.

12245 The Measurement of the Dewpoint and H_2SO_4 Vapour Content of Combustion Products. W. E. Francis. Gas Research Board, Communication GRB 64, June 1952, 37 pages. (TP700 G21c)

In connection with corrosion-prevention studies, deals with an electrical conductivity method for determination of SO_3-SO_2 ratio in gaseous products of combustion and describes research work covering variation of this ratio with factors such as degree of primary aeration, type of burner, and S content of gas. Table, graphs, and apparatus diagrams. 31 ref.

12246 Report of the Director for the Year 1951. Gas Research Board, Communication GRB 67, June 1952, 46 pages. (TP700 G21c)

Covers following topics: gas production, purification and storage; refractory bricks and insulating materials; effluent problems; and utilization of gas. Latter includes a section on corrosion of appliances.

12247 Selection of Oils for Carbureted Water Gas. E. S. Pettyjohn and H. R. Linden. Institute of Gas Technology, Research Bulletin 9, Mar. 1952, 51 pages. (TP700 In7r)

A study to provide a method for above selection by establishing relationships of physical and chemical characteristics of petroleum fractions and residual oils, and of the operating variables, with the enriching values and with the qualities and quantities of the gaseous and liquid products. Tables, graphs, nomographs, equipment and flow diagrams, and photographs. 57 ref.

12248 Selection of Oils for High-BTU Oil Gas. H. R. Linden and E. S. Pettyjohn. Institute of Gas Technology, Research Bulletin 12, Apr. 1952, 48 pages. (TP700 In7r)

Presents experimental data obtained in the thermal gasification of typical gas-making oils under conditions simulating present and anticipated high-Btu. oil gas manufacturing practice, using a 2½ inch i.d., externally heated, laboratory cracking tube. A method of evaluation and selection of oils for high-Btu. oil-gas production was developed. Graphs, photographs, tables, nomographs, and equipment and flow diagrams.

12249 Physical-Chemical Properties of Methane-Nitrogen Mixtures. O. T. Bloomer and J. D. Parent. Institute of Gas Technology, Research Bulletin 17, Apr. 1952, 35 pages. (TP700 In7r)

Contains a literature survey, the laboratory equipment design, experimental techniques, and data from the determination of the phase equilibrium and pressure-volume-temperature relationships for CH_4, N_2, and their mixtures. Tables, graphs, and equipment diagrams. 51 ref.

See also:
11653 (use of high-ash cupola coke)
11995 (products of oxidation of coal)
12286 (aircraft-engine exhaust flames)
12424 (fluidized coal and coke beds)

20. HEATING, DRYING, AND AIR CONDITIONING

12250* Cross-Flow Heat Exchangers. Part II. The Honeycomb Type Exchanger and Some General Considerations. J. K. Reid. *Aircraft Engineering*, v. 24, July 1952, p. 198-205.

Presents extensive details on the above kind of exchanger and some general considerations including economic aspects. Chart, tables, and diagrams.

12251* Practical Experiences With a Pulverized-Coal Furnace With Additional Traveling Grates. (German.) O. Elwert. *Brennstoff-Wärme-Kraft*, v. 4, June 1952, p. 185-188.

Describes problems that led to the construction of a 125-ton furnace of above type. Details of regulating action are indicated; advantages of the construction are discussed. Tables and diagrams.

12252* Preliminary Experiences With a Wagner-Type Ring-Shaped Stoker. (German.) M. Götz. *Brennstoff-Wärme-Kraft*, v. 4, June 1952, p. 198-199.

Reports on results with above stoker. Advantages are indicated. Diagrams show details of construction.

12253 An Experimental Residential Heat Pump. F. C. Hooper. *Canadian Journal of Technology*, v. 30, July-Aug. 1952, p. 180-197.

Research project of University of Toronto. An experimental installation consisting of a ground-source, heat pump, supplemented by resistance heaters, was made in an occupied residence. Data obtained from the 1949-50 heating season on characteristics of the electric load on heating performance, and on operation of the ground coil were analyzed. Graphs, tables, and diagrams.

12254* Air-Water Contact: Adiabatic Humidification of Air With Water in a Packed Tower. Samuel L. Hensel, Jr. and Robert E. Treybal. *Chemical Engineering Progress* (Engineering Section), v. 48, July 1952, p. 362-370; disc., p. 370.

Reviews literature and describes theory. Gives details of equipment, procedure, and results of experiments. Extensive graphs and tables. 14 ref.

12255 Relation of Spreader Stokers to Air Pollution. Max O. Funk. *Combustion*, v. 24, July 1952, p. 41-44.

Tells why some spreader-stoker jobs fail to meet the requirements of local smoke ordinances and points out factors that make for satisfactory performance. A number of typical installations involving several makes of stokers are illustrated.

12256* Improved Heat Transfer in Waste-Heat Boilers. Richard Dolezal. *Engineering*, v. 174, July 25, 1952, p. 103-104.

A method of improving heat transfer in waste-heat boilers is described, the example cited being a boiler designed to utilize the heat of the exhaust gases of internal-combustion engines working with blast-furnace gas. Diagram.

12257 Exploration of a Chilled Jet. H. B. Nottage, J. G. Slaby, and W. P. Gojsza. *Heating, Piping, & Air Conditioning*, v. 24, Aug. 1952, p. 122-131.

Data and interpretations are reported for a chilled ventilation jet discharging horizontally and falling to the floor under the action of buoyant forces. An evaluation of forces and moments acting on the jet establishes the basis for analyzing the vertical drop of the jet axis. A simple empirical relationship is suggested for calculating this vertical drop.

12258 Theory vs. Practice in Radiant Heating. T. Napier Adlam. *Heating and Ventilating*, v. 49, Aug. 1952, p. 99-103.

Part 5 of a 6-part article. Discusses reduction in heat requirements, influence of windows on comfort and heating, and intelligent use of U-values.

12259* Modern Design Principles in Pyro-Processing. Part II. Kiln Systems (Continued.) Factors Controlling Scaling, Balling, and Ringing in Rotary Kilns. Wolf G. Bauer. *Pit and Quarry*, v. 45, Aug. 1952, p. 95-96, 99-102, 112-113.

(To be continued.)

12260* Possibilities of the Heat Pump in the Land of Electricity, Norway. (Norwegian.) Dag Johnson. *Teknisk Ukeblad*, v. 99, Apr. 3, 1952, p. 257-266; Apr. 10, 1952, p. 285-289.

Discusses development and efficiency of heat pumps for industrial and domestic uses in Norway and other countries. Diagrams, graphs, and photographs.

Miscellaneous Publications

12261 The Design of Heat Exchangers For Minimum Irreversibility. Frank A. McClintock. American Society of Mechanical Engineers, Paper 51-A-108, 1951, 12 pages. (TJ1 Am35p)

Explicit equations are obtained and indicate that the best surface is a bank of tubes normal to the flow. Cost factors are covered. Table and diagram.

See also:
12204 (alloy-steel furnace recuperators)
12810 (dielectric-heating theory)
12847 (magnetrons for dielectric heating)

21. PRIME MOVERS

12262* The Promise and Problems of Atomic Power. Gale Young. *Aeronautical Engineering Review*, v. 11, Aug. 1952, p. 22-29, 52.

An address by Technical Director of Nuclear Development Associates. 18 ref.

12263* A Comparison of Axial and Centrifugal Compressor Gas Turbines. A. D. Baxter. *Aircraft Engineering*, v. 24, July 1952, p. 186-188, 197.

Comparison criteria include technical and operational performance, and manufacture and cost. Diagrams and graphs.

12264 Automatic Navigation of a Long Range Rocket Vehicle. H. S. Tsien, T. C. Adamson, and E. L. Knuth. *Journal of the American Rocket Society*, v. 22, July-Aug. 1952, p. 192-199.

The flight of a rocket vehicle in the equatorial plane of a rotating earth is considered with possible disturbances in the atmosphere due to changes in density, temperature, and wind speed. A scheme of tracking and automatic navigation involving a high-speed computer and elevator servo is suggested.

12265 A Method for Comparing the Performance of Power Plants for Vertical Flight. H. S. Tsien. *Journal of the American Rocket Society*, v. 22, July-Aug. 1952, p. 200-203, 212.

A new method of power-plant selection for vertical flight is proposed. It can be used to determine whether the performance of a rocket can be improved by substituting for the rocket motor a different power plant such as a ramjet. 11 ref.

12266 Optimum Burning Program for Horizontal Flight. Albert R. Hibbs. *Journal of the American Rocket Society*, v. 22, July-Aug. 1952, p. 204-212.

The problem of determining the optimum burning program for a jet-propelled missile in horizontal flight, which is required to attain either the maximum total range or the maximum velocity at a given range, is formulated as a problem in variational calculus. The result is found to give only a partial solution. Consideration is given to the question of optimum size and configuration and optimum flight altitude.

12267 The Effect of Variable Propellant Density on Rocket Performance. H. S. Seifert. *Journal of the American Rocket Society*, v. 22, July-Aug. 1952, p. 213-215.

Discusses the effect of an inert and dense additive to the propellant on the performance of a rocket. Includes effect on thrust, missile acceleration, and assisted take-off of aircraft.

12268* Summary of Investigation of Two-Stroke-Cycle Gas-Generator Aircraft Engine. B. I. Sather, F. R. Schuricht, and A. E. Biermann. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 637-652; disc., p. 652-653.

Presents a theoretical analysis of the performance of the ideal gas-generator engine, an analysis of methods of achieving ideal performance when the engine components are fixed, and some experimental results. Certain practical problems connected with the gas-generator type of engine are also discussed.

12269* Design Features of a 5000-Hp Gas Turbine. B. O. Buckland and D. C. Berkey. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 655-660; disc., p. 660-661.

A 5000-hp, one-compressor, two-turbine gas-turbine power plant is described, its features are discussed, and its expected capability and economy are given. Installation requirements such as weights, dimensions, and water requirements are included. Schematic diagrams.

12270* Multistage Radial Turbines. P. F. Martinuzzi. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 663-672; disc., p. 672-673.

Deals particularly with radial turbines for gas-turbine use. The possibility of building a multistage inflow turbine of a type in which all the stages are carried on a single rotor disk is examined. Diagrams.

12271* Review of Optimum Design of Gas-Turbine Regenerators. D. Aronson. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 675-681; disc., p. 681-683.

Presents criteria to be applied for the case in which shape, volume, weight of surface area are the principal limitations on design. The distinctive features of bare-tube design and of extended-surface design are outlined. Graphs, tables, and diagrams.

12272* Wet Compression in an Axial-Flow Compressor. Shao-Lee Soo. *Transactions of the American Society of Mechanical Engineers*, v. 74, July 1952, p. 879-886; disc., p. 886-890.

The problem of wet compression in an axial-flow compressor was studied considering heat and mass transfer. The basic relation between rate of compression, size of water particles, and over-all pressure ratio was obtained. Design criteria of the compressor are outlined. Graphs and photographs.

12273* Pulsations in Gas-Compressor Systems. E. G. Chilton and L. R. Handley. *Tranactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 931-941; disc., p. 941-943.

Discusses the causes of pulsation, their effects on the piping and the compressor, and the methods by which it can be reduced. Numerous graphs, photographs, and schematic diagrams. 33 ref.

12274* Runaway Speed of Kaplan Turbines. G. H. Voaden. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 989-997; disc., p. 997-1004.

Illustrates the type of laboratory test data needed to predict

21. *Prime Movers*

the above. Significant differences between the "on-cam" and "off-cam" runaway speeds are explained and data on actual runaway-speed tests on a large Kaplan turbine installation are given. Numerous charts, diagrams, and photographs.

12275* Nuclear Power? 1. In Britain. 2. In the United States. *Atomics* (London), v. 3, July 1952, p. 173-180.

Survey of progress in above two countries. The British program is considered in greater detail as less information has previously been published on it.

12276* Krauss-Maffei KMD6 Engine; a Loop-Scavenged, Two-Stroke Cycle Diesel Unit. F. Sass and P. H. Schweitzer. *Automobile Engineer*, v. 42, July 1952, p. 252-258.

Describes, diagrams, and illustrates German engine. Presents results of laboratory and road tests. Graphs and tables.

12277 Jet Engine Combustion Chambers Made to Close Tolerances. *Automotive Industries*, v. 107, Aug. 1, 1952, p. 40-41.

Describes the fabrication processes of the inner and outer combustion chambers, and transition liners for the GE J-47 jet engine.

12278 Great Fuel Savings Possible With Ideal Engine-Transmission. D. F. Caris and R. A. Richardson. *Automotive Industries*, v. 107, Aug. 1, 1952, p. 42-46, 76, 78.

A combination power-transmission system is proposed, emphasizing the large gains which is said will be possible. Numerous charts.

12279 New Tractor Engine Convertible for Different Fuels. W. F. Bradley. *Automotive Industries*, v. 107, Aug. 1, 1952, p. 54-55.

Describes an engine built at the Dagenham Works in England which features an overhead-valve engine which can be converted for operation on Diesel fuel, vaporizing oil, or gasoline. Illustrated.

12280* Capacity of High-Pressure Steam Locomotives. (German.) L. Kinkeldei. *Brennstoff-Wärme-Kraft*, v. 4, June 1952, p. 189-193.

Discusses problems involved in the calculation of pressure, storage capacity, and overheating in above locomotive, referred to as the Gilli locomotive. Economic advantages of this design are indicated. Graphs. 10 ref.

12281* The Combustion Chamber for Gas-Turbines. (German.) H. Kühl. *Brennstoff Wärme-Kraft*, v. 4, July 1952, p. 217-221.

Reviews the most important characteristics of the above, such as creation of a favorable mixture distribution with low gas velocity, and of strong eddies. The behavior of combustors during different types of operation, and problems of durability and mounting, are indicated. Diagrams, charts, macrographs, and 10 ref.

12282* 1000 kW Marine Gas Turbines. *Engineer*, v. 194, Aug. 1, 1952, p. 153-155.

Details of a comprehensive series of performance, governing, and endurance trials on the above gas-turbine set complete with heat exchanger. Photograph and charts.

12283* Atomisation of Fuel Sprays. E. Giffen. *Engineering*, v. 174, July 4, 1952, p. 6-10. (A condensation)

Describes fundamental principles of the above, including methods for investigation of atomized sprays and typical results obtained. Graphs, tables, diagrams, and photographs.

12284* Locomotive Testing at Swindon. *Engineering*, v. 174, July 4, 1952, p. 25-28.

Describes stationary-plant and road testing procedures and equipment of British Railways test station. Numerous graphs show typical results.

12285* Principles of Combustion Processes, Especially With Respect to Conditions in the Otto Engine. (German.) W. Jost. *Forschung auf dem Gebiete des Ingenieurwesens*, v. 18, sec. B, no. 2, 1952, p. 29-35.

Shows that detailed studies of the mechanism of chemical reactions and diffusion are required to understand a number of combustion phenomena, such as hot-surface ignition, stepwise spontaneous ignition, knocking, disturbances in a homogeneous combustion process. Diagrams, tables, graphs, and photographs. 32 ref.

12286* The Exhaust Flaming Problem and Inhibition of the Hydrogen-Oxygen Reaction by Hydrocarbons. R. R. Baldwin. *Fuel*, v. 31, July 1952, p. 312-340.

Engine tests showed that the blue component of aircraft-engine exhaust flames, which arise from ignition of CO and H_2 present in the exhaust at rich mixtures, is inhibited by the presence of hydrocarbons in the exhaust. Laboratory studies of the effect of hydrocarbons on the 2nd limit, the 3rd limit and the nitrogen peroxide sensitized ignitions of H_2-air mixtures indicate that correlation with engine tests is best in the case of the nitrogen peroxide sensitized ignition. 31 ref.

12287 Oxidation Characteristics of Lubricating Oils at High Temperatures. H. Diamond, H. C. Kennedy, and R. G. Larsen. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1834-1843.

Work was undertaken to extend fundamental knowledge of oil oxidation up to the highest possible temperatures (without incurring ignition) and to elucidate behavior of lubricants in the upper (hottest) part of an engine. Tables and graphs. 11 ref.

12288 The Pattern of Gas-Turbine Development in Europe and the United States. F. T. Hague. *Mechanical Engineering*, v. 74, Aug. 1952, p. 627-632.

Discusses especially work in England, Switzerland, and the U. S.

12289 Engineering Principles and Metal Requirements for Atomic Power Plants. W. J. Koshuba and V. P. Calkins. *Metal Progress*, v. 62, July 1952, p. 97-114.

An illustrated survey covering: a review of nuclear energy concepts; methods of heat utilization; heat-transfer media including molten metals; kinds of reactors; primary and secondary reactor fuels; reactors in operation or under construction; reactor operation and control; construction materials for reactors; extractive metallurgy of uranium; shielding materials; and radio toxicology.

12290 Gas Turbine in Pipe Line Pumping. T. J. Putz. *Petroleum Engineer*, v. 24, 1952, p. D15-D18.

Initial installation on a gas-transmission pipeline at Farmington, Mo., indicates extent of equipment's suitability. Illustrated.

12291* A Coal-Fired Gas-Turbine Locomotive for British Railways. E. C. Poultney. *Railway Age*, v. 133, July 28, 1952, p. 38-39.

Describes and diagrams new experimental unit now on order.

12292 Remote Opening and Sealing of Metal Tubes. L. T. Loh, H. W. Neill, M. H. Nichols, and E. A. Wenzel. *Review of Scientific Instruments*, v. 23, July 1952, p. 339-341.

"One-shot" methods of opening and sealing metal tubes are described. These methods were developed for taking high altitude atmospheric samples in metal bottles carried aloft by rockets and are performed by pyrotechnic means. The sealing is done by cold welding. Illustrated.

12293* Instrumentation for Devloping Gas Turbines. *SAE Journal*, v. 60, July 1952, p. 60-65.

Article based on paper by R. E. Gorton and B. E. Miller describes Pratt & Whitney aircraft instrumentation at some length. Brief reports based on discussions by Denis A. Drew on Rolls-Royce instrumentation and by John R. Burns on Allison instrumentation. Diagrams and illustrations.

12294* 4 Ways to Combat Auto Spark Plug Fouling. 1. Change Spark Plug Design. H. N. Metzel. **2. New Ignition Systems.** R. C. Beaubier, H. J. Chalk, and M. M. Roensch. **3. Trieresyl Phosphate as Lead Scavenger.** R. J. Greenshields. **4. Proper Servicing.** Howard H. Vogel. *SAE Journal*, v. 60, July 1952, p. 66-71.

Tables and numerous graphs.

12295 Here's How To Hike Piston-Ring-Cylinder Life. *SAE Journal*, v. 60, Aug. 1952, p. 36-38. (Based on "Ring, Piston, and Cylinder Assembly", by Helmuth G. Braendel.)

Summarizes recommendations: no additive oils during run-in; use of sand-cast cylinder sleeves; slight interference fits for dry sleeves; use of conformable oil rings; use of Cr top rings; resizing of pistons by knurling; and modification of pistons to improve oil control.

12296 Turbine Engines Complicate Fuel System Design. *SAE Journal*, v. 60, Aug. 1952, p. 50-52. (Excerpts from "General Design Aspects of Turboprop and Turbojet Aircraft Fuel Systems", by C. Stewart Brandt.)

Discusses above design problems.

12297 Humphreys Engine Provides Variable Clearance Volume. *SAE Journal*, v. 60, Aug. 1952, p. 56-60. (Excerpts from "Humphreys Constant-Compression Engine", by W. H. Paul and I. B. Humphreys.)

The Humphreys engine is a conventional power-plant to which has been added a device for automatically varying the clearance volume of the combustion chamber. Diagram, graph, and illustration.

12298 Progress of Gas Turbine Truck Tests. Henry C. Hill. *SAE Quarterly Transactions*, v. 6, July 1952, p. 395-408; disc., p. 408.

Presents results of a year of test runs with the experimental gas-turbine-powered motor trucks currently being developed by Boeing. Performance and operating characteristics are compared with those of heavy-duty diesel trucks, including results of fuel consumption tests, cooling tests, noise reduction progress, and transmission requirements. Mechanical engine troubles are recounted, together with a description of some of the engineering methods used in determining causes and correction. Includes details of studies of blade failures caused by fatigue and thermal shock. Numerous graphs, tables, and illustrations.

12299 The New Ford Six-Cylinder Engine. E. S. MacPherson. *SAE Quarterly Transactions*, v. 6, July 1952, p. 409-423.

The many innovations and original features of the new Ford 6-cyl. engine are fully described and discussed. Profusely illustrated.

12300 Characteristics of Expansion Turbines for Auxiliary Power. Homer J. Wood. *SAE Quarterly Transactions*, v. 6, July 1952, p. 438-449; disc., p. 449.

The design requirements for machinery of above type class and effects of various factors are discussed. Emphasis is on comparative advantages and limitations of turbine systems.

12301 Early Combustion Reactions in Engine Operation. E. B. Rifkin. *SAE Quarterly Transactions*, v. 6, July 1952, p. 472-487.

Presents results of study of precombustion reactions based on thermodynamic analysis of engine data. Numerous graphs.

12302 Some Effects of Fuel Structure, Tetraethyl Lead, and Engine Deposits on Precombustion Reactions in a Firing Engine. Walter Cornelius and John D. Caplan. *SAE Quarterly Transactions*, v. 6, July 1952, p. 488-508; disc., p. 508-510.

Presents the latest findings in a 30-yr. study by GMC Research Laboratories, seeking the cause and prevention of knock in automotive and aircraft engines. Illustrated. 29 ref.

Miscellaneous Publications

12303 Theoretical Investigation of Velocity Diagrams of a Single-Stage Turbine for a Turbojet Engine at Maximum Thrust Per Square Foot Turbine Frontal Area. Leo Cohen. National Advisory Committee for Aeronautics, Technical Note 2732, June 1952, 34 pages. (TL570 Un3t)

Table and diagrams.

12304 Matrix and Relaxation Solutions That Determine Subsonic Through Flow in an Axial-Flow Gas Turbine. Chung-Hua Wu. National Advisory Committee for Aeronautics, Technical Note 2750, July 1952, 65 pages. (TL570 Un3t)

Results provide a basis for evaluation of simpler, more approximate methods for computing subsonic through flow in turbomachines. Tables, diagrams, and graphs. 13 ref.

Books

12305 The Principles of the Control and Stability of Aircraft. W. J. Duncan. 384 pages. 1952. Cambridge University Press, London. (TL570 D91p)

First volume of the projected Cambridge Aeronautical Series. A systematic account of the above. The subject matter may be regarded as the broader one of the dynamics of aircraft, with certain topics excluded. These latter include flutter, the dynamics of the propulsive machinery, and "performance". Includes 2 chapters by A. D. Young on the topics of spin, stalling, and flaps. Diagrams and references.

12306 Teoreticheskie Osnovy Teplotekhniki; Tekhnicheskaia Termodinamika i Teoriia Teploperedachi. (Theoretical Bases of Combustion Engineering; Engineering Thermodynamics and the Theory of Heat Transfer.) Ed. S. A. M. Litvin. 355 pages. 1950. Government Power Publishing House, Moscow and Leningrad, U.S.S.R. (TJ265 L73t3)

Intended mainly as a textbook for technical schools. It includes material on engineering thermodynamics and the theory of heat transfer. It discusses gas turbines, refrigeration uuits, internal-combustion engines, and use of high-pressure steam. Diagrams, tables, and an appendix.

12307 Airplane Performance Stability and Control. Courtland D. Perkins and Robert E. Hage. 493 pages. 1950. John Wiley & Sons, New York. (TL570 P42a)

Presents those elements of applied aerodynamics that bear directly on the problem of airplane design. In the 1st part, estimation of airplane performance in the subsonic, transonic, and supersonic speed ranges is discussed, as well as effect on airplane performance of the new reaction-type power plants. In the 2nd part, the art of designing the airplane for adequate flying qualities is dealt with. Only subsonic flight is discussed. Tables, graphs, diagrams, performance charts, problems and suggested references for reading.

12308 Steam Power Plants. Alexander H. Zerban and Edwin P. Nye. 524 pages. 1952. International Textbook Co., Scranton, Pa. (TJ395 Z5s)

Intended for junior or senior students in mechanical and electrical engineering who have had some previous work in heat power. The aims are threefold: to utilize fundamental principles of science in the art of heat-power engineering; to discuss economic factors that influence engineering decisions; and to give a general picture of the equipment of representative manufacturers. Problems follow each chapter.

See also:
11931 (engine-wear phenomena)
12234 (ash in the coal-fired gas turbines)
12240 (laboratory gasoline test engines)
12362 (combustion-chamber deposits)
12363 (detergent-type engine lubricants)
12819 (jet-engine ignition systems)

22. CERAMICS

12309 Calculated X-Ray Mass Absorption Coefficients of Glass Components. Gordon F. Brewster. *Journal of the American Ceramic Society*, v. 35, Aug. 1, 1952, p. 194-197.

Above were computed from 0.01 a.u. (1234kv.) to characteristic K absorption edges. Using these values, absorption of x-rays by a glass in the wavelength range considered can be readily calculated from its composition expressed in weight fractions of oxide components and from its density.

12310 Annealing of 517:645 Borosilicate Optical Glass. II. Density. Norbert J. Kreidl and Robert A. Weidel. *Journal of the American Ceramic Society*, v. 35, Aug. 1, 1952, p. 198-203.

Density of above glass increased by more than 1% when samples quenched from the highest temperature at which no further decreases in density were observed were annealed at the lowest temperature at which increases were observed within reasonable time. Conversely, stabilization times increased with decrease of stabilization temperature. This behavior is interpreted theoretically. 21 ref.

22. *Ceramics*

12311 Niobate and Tantalate Dielectrics. Eugene Wainer and Chandler Wentworth. *Journal of the American Ceramic Society*, v. 35, Aug. 1, 1952, p. 207-214.

The ceramic and electrical properties of the columbates and tantalates of the elements of the 1st and 2nd groups of the periodic table were examined. $NaNbO_3$ and $NaTaO_3$ are of particular interest. It appears that $Cd_2Nb_2O_7$ is the ceramic and dielectric analog of $SrTiO_3$. The binary $NaNbO_3 \cdot Cd_2Nb_2O_7$ is the evident analog of $BaTiO_3$ with the exception that its high dielectric constant and piezoelectric properties are maintained over a much broader range of temperature. 24 ref.

12312 Ceramics Shield Stainless For Jets. Robert G. Hicks. *American Machinist*, v. 96, July 21, 1952, p. 99-100.

Experiments of Stewart-Warner's South Wind Div. on methods of applying several coatings, particularly in jet-engine components. Some results: Double metal life at jets when coated properly, minimum intergranular corrosion of some alloys at 1600-2100°F., and proof that coating thickness should range around 0.001-0.003 in.

12313* Cordieritic Saggars of Increased Durability From Australian Talc and Clays. R. R. Hughan. *Australian Journal of Applied Science*, v. 3, June 1952, p. 173-192.

Production of above with data on properties. Tables and graphs. 13 ref.

12314* Recent Results in Oxide Ceramics. (German.) G. Jaeger and R. Krasemann. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.*, v. 29, Mar. 1952, p. 61-67.

History and research results on Al_2O_3 parts are discussed. Photographs, graphs, diagrams, and tables.

12315* Dilatometric Investigation of Porcelain Bodies. (German.) Arthur Zwetsch. *Berichte der Deutschen Keramischen Gesellschaft e.V und des Vereins Deutscher Emailfachleute e.V.*, v. 29, Mar. 1952, p. 73-77.

Dilatometric measurements prove that tensile stress applied to the body will orient its particles. Diagrams, graphs, tables, and photomicrographs.

12316 Corrosion of Refractory Materials. *Blast Furnace and Steel Plant*, v. 40, Aug. 1952, p. 921-925, 927. (Translated by Helen Towers from *Berichte der Deutschen Keramischen Gesellschaft und des Vereins Deutscher Emailfachleute*, v. 29, 1952)

Discusses chemical and physical factors, critically reviewing work done during 1940-1950. Scope is confined to work done in Great Britian with occasional references to American literature. Makes extensive reference to service in metallurgical furnaces. 26 ref.

12317 The Constitution of Refractory Clays. Part III. The Determination of Mineral Constitution. R. W. Grimshaw and A. L. Roberts. **Part IV. The Constitution of Some Yorkshire Fireclays.** K. Carr, R. W. Grimshaw, and A. L. Roberts. **Part V. The Relationship Between Constitution and Properties With Special Reference to the Influence of Micaceous Minerals.** K. Carr, J. Hargreaves, R. W. Grimshaw, and A. L. Roberts. *Transactions of the British Ceramic Society*, v. 51, June 1952, p. 327-351; disc., p. 351-354.

In Part III, a scheme is outlined showing how a complete mineral balance of a clay can be established. It is used in Part IV to determine the mineral constitution of the materials indicated. In Part V, the data obtained are used in an attempt to interpret firing changes. Results are compared with those for synthetic mixtures using purified illite separated from the clays. 14 ref.

12318 The Decomposition of Kaolinte by Heat. E. B. Colegrave and G. R. Rigby. *Transactions of the British Ceramic Society*, v. 51, June 1952, p. 355-367.

Nature of the dehydration of kaolin and the mechanism of mullite formation on the firing of kaolin was investigated by means of differential thermal analysis or x-ray diffraction. Data are charted. 20 ref.

12319 The Firing of Certain Chrome-Magnesite Products. G. H. B. Lovell. *Transactions of the British Ceramic Society*, v. 51, July 1952, p. 369-386.

By firing mixtures of MgO with the spinels associated with Cr ores; with the sesquioxides Al_2O_3, Cr_2O_3, and Fe_2O_3; and with various sesquioxide solid solutions, it was shown that permanent expansions occur only when free sesquioxide or sesquioxide solid solutions are present. These expansions are attributed to recrystallization, resulting in an increase in porosity. The main factors in controlling the expansion are considered. Numerous tables. 20 ref.

12320 An X-Ray Study of the Crystalline Phases That Occur in Fired Clays. H. M. Richardson and F. G. Wilde. *Transactions of the British Ceramic Society*, v. 51, July 1952, p. 387-400.

Chemical composition and the crystalline impurities of 7 clays were first determined. The crystalline phases formed during firing to temperatures between 800 and 1350°C. were then identified by x-ray powder technique. The importance of the crystallization of γ-Al_2O_3 from amorphous Al_2O_3 and its combination with silica to form mullite is discussed. Graphs, tables and x-ray powder photographs.

12321* The Frost Resistance of Fired-Clay—A Perennial Problem. B. Butterworth. *British Clayworker*, v. 61, June 15, 1952, p. 85-89; July 15, 1952, p. 122-124.

A discussion. Covers history of laboratory freezing tests; nature of the frost problem; and need for a standard of severe exposure. Second part describes means for estimating frost resistance in the laboratory, and discusses possible future developments. 37 ref.

12322 Aeronautical Ceramics. Thomas A. Dickinson. *Ceramic Age*, v. 60, July 1952, p. 15-16, 18.

Briefly discusses above, chiefly covering methods of application of ceramic coatings to metal. Photographs.

12323 Cadmium and Selenium Pigments in Porcelain Enamels. IV. Paul A. Huppert. *Ceramic Age*, v. 60, July 1952, p. 27-28.

This final installment discusses Cd pigments as smelter additions; a few miscellaneous applications; and future problems.

12324 Research. *Ceramic Industry*, v. 59, Aug. 1952.

Entire issue is devoted to articles on various aspects of ceramic-industry research: what research is and how much is necessary; how to get the most out of a research program; what competition may do if you're not alert; projects now being run by industry associations; private facilities available for research; how to use the universities; what the plant research department can accomplish; how to keep business booming with product research; and what can be done in your branch of the industry.

12325* Laboratory Porcelain. *Ceramics*, v. 4, July 1952, p. 201-206.

Reviews technology of the above.

12326* Refractories for 4000°F. and Higher. Gordon R. Finlay. *Chemistry in Canada*, v. 4, Mar. 1952, p. 41-43.

Reviews the field of special refractories and includes considerable new data not previously published elsewhere. The refractory carbides, nitrides, and borides, are discussed. Possible applications include crucibles, jet nozzles, refractory liners, and arc or electrolytic electrodes.

12327* Refractory Concrete in Gasworks and Coke-Oven Plant. T. D. Robson. *Coke and Gas*, v. 14, July 1952, p. 241-246.

Outlines technical factors involved in above, and gives examples.

12328* The Surface Properties of Glass. B. Simmingskold. *Glass*, v. 29, July 1952, p. 271-273. (Translated from *Glasteknisk Tidskrift*, v. 6, no. 3, 1951, p. 61-66.)

Examples of some properties of glass which are affected to an important degree by surface state are: resistance to chemical attack, mechanical strength, some of the optical properties, electrical insulation capacity, and adherence of metal deposited on it. Reviews some of the more important results of research in this sphere and their practical consequences. (To be continued.)

12329 Biblography of Thermal Expansion of Glasses. M. D. Karkhanavala. *Glass Industry*, v. 33, Aug. 1952, p. 403-407.
Following a brief introduction, the references are presented in tabular form, arranged in accordance with chemical constituents. (To be continued.)

12330* Orientation and Hardness of Synthetic Corundum. C. Attinger. *Industrial Diamond Review*, new ser., v. 12, July 1952, p. 136-137.
Systematic hardness tests were made on corundum in order to reveal any possible effect of the angle formed by the geometric boule axis and the optical axis. Experimental results are tabulated.

12331* Directional Hardness and Abrasion Resistance of Synthetic Corundum. W. Stern. *Industrial Diamond Review*, new ser., v. 12, July 1952, p. 137-140.
Gives experimental results of tests on the above conducted by the Industrial Diamond Information Bureau. Graphs and tables.

12332* Calculations on Carbon Hearths for Blast Furnaces. E. W. Voice. *Iron and Steel Engineer*, v. 29, July 1952, p. 125-128.
Discusses the question of optimum type of carbon, thickness of construction and size of carbon block. Results of recent experiments on hearth linings are summarized. Graphs.

12333* Viscosity of Glass. Webster Capps. *Journal of Colloid Science*, v. 7, June 1952, p. 334-342.
Reviews methods for measuring viscosity and work on relating the data to structure of glass and to size of units participating in the flow process. Evidence is given that many glasses are Newtonian liquids in both high and low viscosity ranges. 32 ref.

12334* Convair Saves Money and Metal With Fiber-Glass Tooling. Charles O. Herb. *Machinery* (American), v. 58, July 1952, p. 172-177.
Illustrated description of use and production of above tools at Consolidated Vultee Aircraft Corp., San Diego.

12335* Surface Finishes Improve Performance of Technical Ceramics. Hans Thurnauer. *Materials & Methods*, v. 36, July 1952, p. 88-91.
Describes various finishing methods which can significantly add to the service performance of technical ceramics. Discusses ceramic glazes, moisture-repellent treatments, grinding for precision, polished ceramics, controlled surface roughness, and metallic coatings. Illustrated.

12336* Some Experiments and Theories on the Power Factor of Glasses as a Function of Their Composition. III. J. M. Stevels. *Philips Research Reports*, v. 7, June 1952, p. 161-168.
Previously abstracted from French version: *Verres et Refractories*, v. 6, Jan.-Feb. 1952, p. 3-7.

12337* Magnesia From Sea Water. W. C. Gilpin and N. Heasman. *Refractories Journal*, July 1952, p. 302-307.
Discusses increasing demand and applications for Mg and its compounds, chemistry and practical procedures and equipment, the sea-water process, and refractory problems associated with this process.

12338* Refractories and American Productivity. *Refractories Journal*, July 1952, p. 308-311.
Observations on quality, application and performance of refractories, and some comparisons of British and American practice.

12339* Improved Materials for Tank Blocks. T. S. Busby and J. H. Partridge. *Journal of the Society of Glass Technology* (Transactions Section), v. 36, June 1952, p. 131-136.
Structure and composition of tank-block materials, especially of mullite and zircon-mullite composition, are discussed, and a method for measuring the corrosion of refractories by immersing 1-cm. cubes of the material in molten glass is described.

12340* Partial Molar Volumes in Alkali Oxide-Silica Systems. R. J. Callow. *Journal of the Society of Glass Technology* (Transactions Section), v. 36, June 1952, p. 137-141.
Above at 25°C. are derived. Their bearings on theories of the structure of silicate systems is discussed.

12341* The Ternary System Na_2O-FeO-SiO_2. P. T. Carter and M. Ibrahim. *Journal of the Society of Glass Technology* (Transactions Section), v. 36, June 1952, p. 142-163.
Thermal equilibrium diagrom of the FeO-$2Na_2O \cdot SiO_2$-SiO_2 portion of the Na_2O-FeO-SiO_2 system was constructed from thermal, microscopic, and x-ray data. Distribution of phases at room temperature was established. Excellent micrographs. 17 ref.

12342* The Viscous Flow of Glass at Low Temperatures. I. Peyches. *Journal of the Society of Glass Technology* (Transactions Section), v. 36, June 1952, p. 164-180.
It is suggested that the majority of commercial glasses, which are incompletely melted and then rapidly chilled by blowing, pressing, drawing, or rolling, have a chemical heterogeneity which is undetectable by ordinary chemical methods. As normally manufactured, the surface of bulk glass and glass is so rapidly chilled that a high-temperature structure persists. Commercial annealing does not remove this structure, although fine annealing in which glass is held for long periods in the annealing range, does so. Effects produced by such rapid chilling are illustrated by reference to the viscous flow of fibers rapidly chilled by water during drawing. Concludes that many routine measurements of physical properties of manufactured products are vitiated by the thermal treatment applied in the laboratory. 10 ref.

12343* A Year's Achievements in Selenium Economy in the Making of "White Flint" Glasses. H. W. Howes. *Journal of the Society of Glass Technology* (Transactions Section), v. 36, June 1952, p. 181-191; disc., p. 192-194.
The need for conserving Se supplies while continuing the production of decolorized glass is stressed. The Fe and Cr content of the raw materials, and that resulting from transportation, mixing, conveying and melting are compared with Fe content of the finished glass. Effects on the quantity of Se necessary for decolorizing of additions of As, $NaNO_3$, sulfates, and Co, and of melting and working properties are discussed. In tests on two furnaces, it was found that selenities could replace the equivalent amount of Se without affecting the color of the glass.

12344* The Formation of Mullite by the Decomposition of Kaolinite. Victor R. Palmeri. *Journal of the Society of Glass Technology* (News Section), v. 36, June 1952, p. 25-28. (Translated from *Anales de la Sociedad Cientifica Argentina*)
Influence of various factors on formation of mullite by heat treatment of kaolinite, clays, and kaolin was investigated. Micrographs. 11 ref.

12345 Lofty Temperatures Held in Check. *Steel*, v. 131, Aug. 11, 1952, p. 94.
Subjecting a molten stream of Al_2O_3, SiO_2, and certain modifying agents to a controlled blast of air produces a ceramic fiber trandemarked Fiberfrax. It resists temperatures that melt cast iron, yet its fineness is such that it can be used as a superfilter, as a base for entirely new types of insulation, and in fireproof and electrical papers.

12346* Manufacture of Paper From Glass Fibers. Martin J. O'Leary, Bourdon W. Scribner, Joshua K. Missimer, and James J. Erving. *Tappi*, v. 35, July 1952, p. 289-293.
Describes a paper made entirely of glass fibers, with no additive, developed at the National Bureau of Standards in cooperation with the Naval Research Laboratory for use as an air filter. May be useful also for filtration of liquids, and should have extensive applications in electronic and other electrical equipment because of its excellent insulating properties and very high resistance to heat. Photographs and tables.

12347* Porous Concrete. (Norwegian.) *Teknisk Ukeblad*, v. 99, June 5, 1952, p. 454-458.
Discusses method of production and study of properties of above. Photographs, tables, and graphs.

Miscellaneous Publications

12348 Fire Test of Gunite Slabs and Partitions. Nolan D. Mitchell. National Bureau of Standards, Building Materials and Structures Report 131, May 12, 1952, 11 pages. (TA401 Un3b)
8 slabs and 4 partitions made with gunite concrete on wire-

22. *Ceramics*

fabric reinforcement were subjected to fire-endurance tests. Slabs were made with aggregates composed of sand and wood sawdust, with sawdust ranging 0-50% by volume of the aggregate. Photographs, tables, graphs and equipment diagram.

12349 Properties and Thermal Behavior of North Carolina Sillimanite. Hugh H. Wilson, Jr. Department of Engineering Research, North Carolina State College, Bulletin 52, Feb. 1952, 13 pages. (TA21 N81b)

A study of North Carolina sillimanite to determine its basic properties and possible uses. Found stable up to about 1500°C. Additions of plastic clay, alumina, and a mineralizer were also investigated. Considers that it could advantgeously be used in the manufacture of high-temperature refractories. Photomicrographs, graphs, diffraction patterns, and tables.

12350 Appraisal of Several Methods of Testing Asphaltic Concrete. Fred J. Benson. Texas Engineering Experiment Station, Bulletin 126, June 1952, 179 pages. (T21 T31b)

Extensive investigation. 3 methods of compaction were used and 6 stability test procedures were studied. Primary objectives were to determine whether or not correlation existed between test procedures; to study effect of variations in type of aggregate, quantity of asphalt, and grade of asphalt on stability values; and to study effect of compaction procedure on density of mixtures and on results of stability tests. Tables, diagrams, photographs, and graphs. 44 ref.

See also:
11994 (fluorescent x-ray spectrometer in ceramics)
12246 (refractories in the gas industries)
12332 (carbon hearths for blast furnaces)
12395 (structural data on concrete)
12404 (manufacture of low-density ceramics)
12479 (vaporization of graphite and derived constants)
12575 (glass-reinforced plastics)
12615 (glass fiber-reinforced plastics)
12733 (glass-fiber insulation)
12738 (ferromagnetic properties of Mn-Zn ferrites)
12739 (magnetic properties of chromites)
12890 (fiberglas yarns—quality and electrical applications)

23. LUBRICATION AND FRICTION

12351* Oil Flow in Plain Journal Bearings. S. A. McKee. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 841-845, disc., p. 845-848.

An analysis is given and results discussed of factors affecting leakage of oil from the ends of plain journal bearings fed either through an oil hole or an axial groove on the unloaded side, or a circumferential groove. Tables, graphs, and diagrams.

12352* Oil Flow, Key Factor in Sleeve-Bearing Performance. D. F. Wilcock and Murray Rosenblatt. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 849-865; disc., p. 865-866.

Work is concerned primarily with the nature and quantitative determination of oil flow, together with simplified methods for calculation of bearing performance made possible thereby. Discussion is restricted to those bearings having oil fed under pressure to their oil-distribution grooves. Diagrams and graphs; numerous tables.

12353* On the Solution of the Reynolds Equation for Slider-Bearing Lubrication. I. A. Charnes and E. Saibel. *Transactions of the American Society of Mechanical Engineers-* v. 74, July 1952, p. 867-872; disc., p. 872-873.

An exact solution is developed for the Reynolds equation in the hydrodynamical theory of slider-bearing lubrication with side leakage for film thickness varying exponentially. This solution is in the form of a rapidly covergent series from which various calculations may be made rapidly for all values of the parameters concerned.

12354* Effect of Variations in Viscosity of Lubricants Upon Timken OK and Psi Values. I. S. Kolarik, C. A. Zeiler, and E. M. Kipp. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 875-877; disc., p. 877-878.

Investigation was conducted to determine the magnitude of hydrodynamic-lubrication effects associated with viscosity in determing OK loads, particularly for e.p. gear lubricants. The effect of rubbing speeds was also studied.

12355* A Simple Process for Testing Lubricants in Case of Boundary Friction. (German.) Max Pfender. *Erdöl und Kohle,* v. 5, June 1952, p. 342-348.

Describes above process. Experimental details are outlined, results tabulated and charted. Macrographs of lead samples immersed in oil are presented and discussed. Includes graphs and tables.

12356* On the Influence of Metal, Especially Copper, on the Oxidation of White Oil. D. J. W. Kreulen. *Journal of the Institute of Petroleum,* v. 38, June 1952, p. 449-457.

Previous work of the author on the oxidation of white oil is reviewed and factors necessary for a reliable oxidation test are formulated. Experiments with Cu as such, Cu reduced in a stream of H_2, and also with Cu_2O, are discussed. A method is given for the determination of slight amounts of dissolved Cu in oil.

12357* The Rheology of a Lubricating Oil at Temperatures Below the Pour Point. S. P. Jones and J. K. Tyson. *Journal of Colloid Science,* v. 7, June 1952, p. 272-283.

Presents observations on the behavior of a lubricating oil below the pour point in a rotational, concentric-cylinder viscometer, and some aspects of the rheology of a suspension of a normal paraffin hydrocarbon in a petroleum oil.

12358 The Development of a Turbo-Prop Synthetic Lubricant. L. D. Christensen. *Lubrication Engineering,* v. 8, Aug. 1952, p. 177-179, 197-200.

Because of the inability of a single petroleum oil to perform satisfactorily at extreme high and low temperatures, a synthetic-base lubricant has been developed for use in the turboprop engine. The material is an excellent lubricant, is resistant to oxidation and thermal decomposition at temperatures in excess of 400°F., and provides for operation in the vicinity of 65°F. It consists essentially of a dibasic acid ester with additives to impart other desired properties. It contains no extreme pressure additives because of their corrosive and sludge-forming action on certain metals.

12359 Lubrication and the Load-Carrying Capacity of Gears. E. T. Hutt. *Lubrication Engineering,* v. 8, Aug. 1952, p. 180-182, 201-202; disc., p. 202-203.

The functions of oil supply are reviewed in relation to recognized types of gear failure and the oil shown to be much more than a mere lubricant in the exact sense of the word. Ways in which operating conditions and choice of lubricating oil can influence scoring and pitting of gears in service are considered and some research findings concerning influence of oil properties and other factors are discussed. 18 ref.

12360 Oil Fog Lubrication. D. G. Faust. *Lubrication Engineering,* v. 8, Aug. 1952, p. 183-185, 203-204; disc., p. 204-205.

Surveys procedures and equipment. Diagrams, graphs, and illustrations.

12361* A Test for Lubricating Oil Stability. C. O. Johnson. *Railway Mechanical and Electrical Engineer,* v. 126, July 1952, p. 59-62.

Describes and illustrates test apparatus and procedure developed by Seaboard Air Line's Research and Test Laboratory for evaluation of heavy-duty oils used in diesel locomotives. The test consists of the flowing of a thin film of oil over a heated steel strip in the atmosphere and recirculating the oil for a definite period. Typical results are charted and illustrated.

12362 Oil Has Small Effect on Combustion-Chamber Deposits. *SAE Journal,* v. 60, Aug. 1952, p. 32-33; disc., p. 33-34. (Based on "An Engine Laboratory Study of Motor Oil Characteristics as One of the Factors Influencing Combustion-Chamber Deposits", by D. E. Carr, L. A. McReynolds, S. C. Britton, and R. E. Linnard.)

Briefly describes and discusses results of above investigation.

12363 Field Performance of Detergent-Type Motor Oils in Gasoline-Powered Vehicles. A. C. Pilger, Jr. *SAE Quarterly Transactions,* v. 6, July 1952, p. 424-436; disc., p. 436-437.

Presents results of field tests for the principal types of gasoline-engine-operation that are critical from the standpoint of engine deposits: heavy-duty highway truck service, light-duty city pickup and delivery service, and high-speed cross-country passenger-car operation. Numerous tables and photographs.

See also:
11931 (lubrication effects on engine wear)

24. DESIGN

12364* Advance Report of Committee 15: Iron and Steel Structures. American Railway Engineering Association. Rigid Frame Analysis for Members of Variable Moment of Inertia, Directed Especially Towards Floorbeam Hanger Frames and Counterweight Trusses—Analytical and Experimental Studies. *American Railway Engineering Association Bulletin,* v. 54, June-July 1952, p. 1-173.

Consists of introduction plus the following articles: "The Equivalent Joint Method of Rigid Frame Analysis, Modification of Slope Deflection by Successive Approximations", L. T. Wyly; "Analysis of Primary and Secondary Stressses in the Counterweight Trusses of a Heel Trunnion Bascule Bridge", L. T. Wyly and K. H. Lenzen; "Experimental and Analytical Studies of Stress Distribution in Laboratory Models of Floorbeam Hanger Frames", J. W. Cox; "Experimental and Analytical Studies of the Stress Distribution in a Floor-Beam Hanger Frame Model Cut From a Solid Plate", M. B. Scott and W. J. Grady, Jr.; and "Results of Field Tests on Bascule Bridges", by the AAR Research Staff.

12365* The Life of High-Speed Ball Bearings. A. B. Jones. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 695-699; disc., p. 699-703.

Describes effects of thrust and radial loads in relation to the above. Graphs and diagrams.

12366* Operating Characteristics of Cylindrical Roller Bearings at High Speeds. E. F. Macks, Z. N. Nemeth, and W. J. Anderson. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 705-710; disc., p. 711-713.

Significance of bearing operating temperature is discussed with regard to bearing operating limitations. The extent of the effects of various operating variables upon inner-race and outer-race temperatures is shown. Graphs and diagrams.

12367* The Stresses in a Pressure Vessel With a Flat Head Closure. G. W. Watts and H. A. Lang. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1083-1090; disc. p. 1090-1091.

Presents the results of computations for determining the above stresses. The range of calculation includes most vessel sizes encountered in practice. Includes a discussion of the mathematical procedure. Much information is tabulated.

12368* Pressure-Loss Measurements on Gate Valves With Necked-Down Cross Sections. (German.) H. Hafekamp and W. Schoch. *Brennstoff-Wärme-Kraft,* v. 4, June 1952, p. 193-195.

Reports on investigation on unusually large pressure losses in above valves. Describes various construction innovations to compensate for these losses. Includes schematic diagrams.

12369* Mechanical Types of Variable-Speed Drives. Lev A. Trofimov. *Electrical Manufacturing,* v. 50, Aug. 1952, p. 82-87, 290.

Five groups of mechanical variable-speed transmissions and motor drives are systematically analyzed to determine operating principles, construction, horsepower, and speed range. Numerous tables and schematic diagrams.

12370* Worm Gear Design. Harry Walker. *Engineer,* v. 194, July 25, 1952, p. 110-114.

Discusses BSS 721 for the above. Points out certain limitations and proposes modifications. Diagrams and graphs.

12371* The Dynamic Capacity of Roller Bearings. G. Lundberg and A. Palmgren. *Engineers Digest,* v. 13, July 1952, p. 217-219. (Translated and condensed from *Acta Polytechnica* (Mechanical Engineering Series) v. 2, no. 4, 1952, 32 pages.)

Previously abstracted from original.

12372* Contours of Free Discharge Jets and Their Technical Applications. (German.) H. W. Hahnemann. *Forschung auf dem Gebiete des Ingenieurwesens,* v. 18, sec. B, no. 2, 1952, p. 45-55.

A theoretical study. Graphs and tables. 13 ref.

12373* Analysis of Elastic Structures by Matrix Transformation With Special Regard to Semimonocoque Structures. Börje Langefors. *Journal of the Aeronautical Sciences,* v. 19, July 1952, p. 451-458.

14 references.

12374* Creep Buckling of Columns. Charles Libove. *Journal of the Aeronautical Sciences,* v. 19, July 1952, p. 459-467.

Creep of a slightly crooked H-section column carrying a constant load was studied theoretically. The analysis is intended for any material having creep properties of the same form and for which the material having constants are known. Applicability to 75S-T Al alloy at 600°F. and low-alloy steel at 800 and 1100°F. is indicated.

12375* Buckling of Sandwich Cylinders Under Bending and Combined Bending and Axial Compression. Chi-Teh Wang and D. P. Sullivan. *Journal of the Aeronautical Sciences,* v. 19, July 1952, p. 468-470, 485.

12376 Four-Bar Linkages. Josef Boehm. *Machine Design,* v. 24, Aug. 1952, p. 118-122.

Describes use of a curvograph to determine mechanism proportions. Diagrams.

12377 Clutches. A. F. Gagne, Jr. *Machine Design,* v. 24, Aug. 1952, p. 123-158.

Gives details of design, selection, and application for optimum performance. Includes tables of characteristic features of commercially available clutches, of industrial clutch manufacturers, and of frictional properties of metallic and nonmetallic clutch materials. Numerous diagrams and illustrations. 31 ref.

12378 Quality Control Methods; Their Use in Design. Part 2. Production Under Control. Dorian Shainin. *Machine Design,* v. 24, Aug. 1952, p. 171-175.

Discusses recommended procedures and advantages of the above.

12379 Redesign for Plastics. *Machine Design,* v. 24, Aug. 1952, p. 176-178.

Describes and illustrates several examples of the above. Lewyt Corp. has converted 16 vacuum-cleaner parts formerly made of metal or rubber to plastics.

12380 Chart Simplifies Stress Calculations. Harold M. Durham. *Machine Design,* v. 24, Aug. 1952, p. 179-181.

Among the problems readily solved are: bending and torsion by the maximum-stress, maximum-strain, maximum-strain-energy and maximum-shear theories; factors of safety and stress ratios; principal stresses and resulting shear; and tension and resulting shear. 7 typical examples.

12381 Safety Circuits for Hydraulic Machines. H. L. Stewart. *Product Engineering,* v. 23, Aug. 1952, p. 124-129.

Schematic diagrams.

12382 The Mechanical Push-Pull—A Remote Control for Industrial Use. Howard Holmes. *Product Engineering,* v. 23, Aug. 1952, p. 152-155.

Above control, in its current stage of development, offers a precise method of transmitting motion from one point to another, over long periods of time, with negligible loss of efficiency and with a minimum of maintenance. Diagrams and illustrations.

12383 Converting Decimal Fractions to Actual Gear Ratios. Gerald Smithson. *Product Engineering,* v. 23, Aug. 1952, p. 158-161.

Procedure described in detail is illustrated by examples.

24. *Design*

12384 How To Design Parts That Assemble and Lock By Twisting. *Product Engineering*, v. 23, Aug. 1952, p. 162-163.

Series of diagrams and captions.

12385 Fundamental Transverse Frequencies of Tapered Cantilever Bars. Walter W. Soroka. *Product Engineering*, v. 23, Aug. 1952, p. 175-177.

Assumed mode shapes used in calculation of the fundamental frequencies of cantilever bars are applied to bars of constant circular cross-section and to conical bars. Inherent errors are compared and a more accurate mode shape is derived.

12386 Current Practice in Tractor Bevel Gears. Wayne H. Worthington and Kenneth J. Harris. *SAE Quarterly Transactions*, v. 6, July 1952, p. 531-546.

The study presented is based upon an analysis of 68 pairs of tractor bevel gears, selected by 10 tractor manufacturers as representative of best current practice. Discusses basic bevel-gear systems in use, based upon method of cutting; and method of calculation and selection of factors determing static and maximum tensile stresses. Summarizes static and maximum tensile stresses, fatigue life analysis, materials, and heat-treatment.

12387 Experimental Study of the Transverse Impact of a Mass on a Column. William H. Hoppmann. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 21-30. (TG265 So13p)

Contains results of an experimental investigation of response of columns to impact from a solid sphere. Three columns were tested. Comparison is made between theoretical and experimental results.

12388* Behavior of an Idealized Steel H Column Above the Elastic Range. Walter H. Weiskopf. *Welding Journal*, v. 31, July 1952, p. 353s-360s.

A mathematical method of analyzing H columns bent about the strong axis. Also describes type of failure and magnitude of direct load and bending moments causing it.

Miscellaneous Publications

12389 Prediction of Stresses in a Structure Under an Arbitrary Dynamic Loading. T. H. H. Pian and J. N. Siddall. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 1-2. (TG265 So13p)

An experimental method for the above is described. It is shown theoretically that stress response to a harmonically oscillating force at a given point on the structure may be used to predict response to any arbitrary force at the same point. Tests are described in which a model wing was shaken at resonant frequencies and stress response recorded on an oscillograph.

12390 Analysis of Localized Stresses in Drilled Calender Rolls. James T. Bergen. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 13-20. (TG265 So13p)

Localized stresses occurring at heat-transfer-fluid ducts of a large calender roll were investigated by means of a photoelastic model.

12391 Model Arches in the Flexible Range-Testing Technique. Robert S. Rowe and Sidney Shore. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 31-42. (TG265 So13p)

Presents methods and test equipment used to measure moments and thrusts in flexible model arches. Diagrams, graphs, and illustrations.

12392 The Mechanical Foundations of Elasticity and Fluid Dynamics. C. Truesdell. *Journal of Rational Mechanics & Analysis*, v. 1, Apr. 1952, p. 125-300. (Reprint) (QC191 T76m)

Consists of an introduction and chapters on isotropic functions; general theory of continuous bodies; elasticity; fluid dynamics; superposition theories; and progress and program of the general theories. Numerous references.

Books

12393 Stroitel'nye Mashiny. Chast I. (Building Machinery. Part I.) N. G. Dombrovskii, A. A. Vainson, and K. V. Alferov. 431 pages. 1949. Government Publishing House of Building Literature, Moscow, U.S.S.R. (Th900 D71s)

Covers problems of construction, theory, and design of basic types of construction machinery. It is principally a textbook for mechanical engineers and machine designers. Part I covers general problems of theory and design of construction and transporting machinery, earth movers, and hoists.

12394 Rigid Frame Formulas. A. Kleinlogel. 460 pages. 1952. Frederick Ungar Publishing Co., New York. (Translated from 11th German edition, Verlag Wilhelm Ernst & Sohn, Berlin, 1943(TG265 K67rtr)

Explicit formulas of all statical quantities for single-panel frames which occur in practical steel, reinforced concrete, and timber construction. 114 rigid-frame shapes with 1,643 figures. General and special load conditions including temperature changes. Introduction and appendix with load terms and illustrative examples.

12395* Data Book for Civil Engineers. Vol. I. Design. Ed. 2. Elwyn E. Seelye. 521 pages. 1951. John Wiley and Sons, Inc., New York. (TA151 Se35d2)

Prime purpose is to furnish the engineer with sufficient data for designing any civil-engineering work without other reference books. Included are structural data on concrete, steel and Al, and welding, and one page on metal corrosion. Present edition has been brought up to date, and expanded in such aspects as simplified solutions; soil mechanics; airfield, highway, and bridge design; and industrial waste treatment.

See also:
11904 (roller-bearing design)
11920 (design loads of Al columns)
12261 (design of heat exchangers)
12296 (fuel system design for turbojets)
12802 (design of sweptback wings)
12842 (engineering design of aircraft radar)

25. CHEMICAL TECHNOLOGY

12396* Investigations on Lignin and Lignification. IX. The Relationship Between the Action of Brown Rot Fungi, Cellulose Degradation and Lignin Composition in Bagasse. George de Stevens and F. F. Nord. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3326-3328.

A comparative study was made of the effect of 4 wood-destroying fungi of the "brown rot" type on the dissimilation of cellulose in bagasse. Lignins liberated by the cellulolytic action of each of these molds were characterized. Their identity with bagasse native lignin is discussed. Tables. 13 ref.

12397* Fibers, Fabrics, and Finishes of the Future. G. M. Gantz. *American Dyestuff Reporter*, v. 41, July 21, 1952, p. P447-P452.

Discusses economic and technological trends. Economic data are tabulated and charted. 15 ref.

12398* Problems Presented by the New Fibers. Herman P. Baumann. *American Dyestuff Reporter*, v. 41, July 21, 1952, p. P453-P456.

Discusses dyeing problems that have been raised by the advent of new synthetic fibers into the textile field. With the discovery of the use of carriers, of the effectiveness of temperatures from 205 to 250°F., and of the use of cuprous copper in promoting dyeing, methods are now available for dyeing Dacron polyester fiber, Dynel, Acrilan acrylic fiber, and Orlon acrylic fiber. These procedures are all discussed. Gives simple staining procedures by which the new fibers can be readily distinguished.

12399* An Investigation of Urea-Formaldehyde Fixation on Viscose Rayon. R. F. Nickerson. *American Dyestuff Reporter*, v. 41, Aug. 4, 1952, p. P482-P486.

Laboratory study of the wash-fastness of urea-formaldehyde resin on above is reported. Method is widely used for quality control and process evaluation work in resin finishing. Tables and graphs.

12400* Vacuum Impregnation of Converted Paper Products. Thomas A. Dickinson. *American Paper Converter*, v. 26, Aug. 1952, p. 14-15, 68.

Surveys equipment, procedures, and applications. Illustrated.

12401 Chemical Process Industries Pace the Nation's Economic Growth. *Chemical Engineering*, v. 59, July 1952, p. 160-165.

Forecast of trends during the 50 years ahead. Tables and graphs.

12402 Problems of the Future of the Chemical Industries. *Chemical Engineering*, v. 59, July 1952, p. 179-208.

More than 100 authorities in 25 different industries discuss their outstanding problems.

12403 New Graph Correlates Operating Labor Data for Chemical Processes. Henry E. Wessel. *Chemical Engineering*, v. 59, July 1952, p. 209-210.

Concerns man-hours per ton per processing step vs. size of the plant in tons of product per day, without regard to the particular process.

12404 How Low-Density Solids are Made. John A. Abbott. *Chemical Engineering*, v. 59, July 1952, p. 212-215, 401-402, 404.

Principal ways of making foamed and cellular products from rubber, plastics, glass, regenerated cellulose, and concrete.

12405 Hardboard From Slabwood. *Chemical Engineering*, v. 59, July 1952, p. 258-261.

Desscribes Allboard process of Oregon Lumber Co., Dee, Ore. Pictorial Flowsheet.

12406 What You Can Do With Acetylene. *Chemical Engineering*, v. 59, July 1952, p. 386, 388-390, 392. (Condensed from a talk by H. S. Sutherland)

Discusses chemical uses of above. Considers some technological improvements and potential applications.

12407 Developments in Synthetic Liquid Fuels. *Chemical and Engineering News*, v. 30, Aug. 11, 1952, p. 3248-3256.

Companion reports from National Petroleum Council, which says "Bu Mines Cost Depend Too Heavily on By-Products"; and from Bureau of Mines, which says "Time Ripe for Commercial Development of Synthetic Fuels." Includes extensive tabular data.

12408* Metals Poisoning of Fluid Cracking Catalyst. B. J. Duffy, Jr., and H. M. Hart. *Chemical Engineering Progress* (Engineering Section), v. 48, July 1952, p. 344-347; disc., p. 348.

At Sugar Creek, Mo., refinery of Standard Oil Co. of Indiana, 3 different high-metals heavy gas oils, available at various times over a 2-yr. period, were used successively as marginal cracking stocks. During this period, 2 batches of catalyst were employed. Selectivity effects observed under these conditions, as well as quantitative methods developed for predicting selectivity degradation and catalyst requirements for selectivity control are described.

12409* High-Pressure Hydrogenation of Crude Shale Oil. M. G. Pelipetz, M. L. Wolfson, H. Ginsberg, and E. L. Clark. *Chemical Engineering Progress* (Engineering Section), v. 48, July 1952, p. 353-356.

Crude shale oil, obtained by retorting Colorado oil shale in a gas-flow retort, was hydrogenated over several solid catalysts in a continuous high-pressure unit on a once-thorough basis. At 9000 psig. Hg pressure and at 800-900°F., a product oil essentially free of sulfur and nitrogen and suitable for further processing by standard petroleum methods can be produced. Using tungsten or cobalt molybdate catalysts, 40-50 vol. % of the product oil obtained by hydrogenation can be utilized as high-quality diesel fuel. 10 ref.

12410* New Information on Heat Transfer With and Without Change of State. (German.) Emil Kirschbaum. *Chemie-Ingenieur-Technik*, v. 24, July 1952, p. 393-400.

Summarizes results of experiments using a new "universal apparatus (described, diagrammed, and illustrated), for studies of evaporation, condensation, heating, and cooling. For condensing steam, theory and experiment, also film-type and dropwise condensation, are compared. Unusual observations are reported and discussed, including effect of foam on heat transfer in vertical evaporator pipes. 12 ref.

12411* Results of Measurements in Laboratory Distillation Practice. (German.) Helmut Kolling. *Chemie-Ingenieur-Technik*, v. 24, July 1952, p. 405-411.

Reports on measurements with laboratory packed columns. Effects of various factors are discussed. Diagrams and graphs. 13 ref.

12412* Recent Progress in the Preservation of Organic Materials. J. W. Suggitt. *Chemistry in Canada*, v. 4, May 1952, p. 37-40.

A few of the more important methods of incorporating fungus resistance are described for such fields as paints, plastics, timber, electrical insulation, rope, and leather. 49 ref.

12413* Fungal Requirements in Government Specifications. Sam Ruggeri. *Electrical Manufacturing*, v. 50, Aug. 1952, p. 115-116, 302, 304, 306, 308.

Presents a list of various government and military specifications that relate to deterioration by tropical conditions (fungi and moisture) in certain types of electrically operated and electronic equipment, basic materials, and components.

12414* Pentachlorophenol Grease for Preserving Poles. F. J. Meyer and R. M. Gooch. *Electrical Light and Power*, v. 30, Aug. 1952, p. 108-111.

A grease containing pentachlorophenol in oil shows promise of becoming an excellent preservative for treating wood poles and crossarms in need of treatment after many years of service. Illustrated.

12415* New Experiments on Purification of Gas and Simultaneous Production of Liquid Fuel. (German.) W. Baum. *Gas und Wasserfach*, v. 93, July 1, 1952, p. 374-375.

Reports on experiments done in Berne, Switzerland, for purification of city gas. Experimental equipment is shown in flow-chart form; results of experiments are tabulated.

12416 Preparation of Cation Exchange Resins of High Physical Stability. R. M. Wheaton and D. F. Harrington. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1796-1800.

Work was carried out to develop methods for the preparation and maintenance of ion-exchange particles of good physical stability, to broaden the applications of these materials. Indicates steps that are useful in producing ion-exchange particles of desirable stability. In addition, supplies information needed to cope with the problem of resin disintegration during actual operations and illustrates some of the undesirable end results of physical breakdown. Graphs and photo-micrographs.

12417 Experimental Catalytic and Thermal Cracking at High Temperature and High Space Velocity. R. C. Archibald, N. C. May, and B. S. Greensfelder. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1811-1817.

Present study was undertaken to investigate the benefits that might accrue from the above. Diagrams, tables, and graphs. 11 ref.

12418 Liquid Phase Hydrocarbon Oxidation. E. R. Booser and M. R. Fenske. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1850-1856.

Oxygen-absorption rates and types of oxidation products for some pure hydrocarbons of widely different structures were determined and compared with similar data for several hydrobarbon mixtures and a composite lubricant. The effects of metal wire catalysts and temperature variations were observed. Graphs and tables. 18 ref.

12419 Composition of Virgin, Thermal, and Catalytic Naphthas From Mid-Continent Petroleum. William E. Cady, Robert F. Marschner, and Wendell P. Cropper. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1859-1864.

Work done over a period of nearly 10 yrs., as part of a program designed to reduce important petroleum refinery streams to individual compounds. Extensive graphs and tables. 26 ref.

12420 Simplified Method of Interpreting Kinetic Data in Fixed-Bed Ion Exchange. Alan S. Michaels. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1922-1930.

Object was to examine certain variables affecting monovalent cation exchange on a representative commercial ion-exchange resin, in an attempt to develop correlations useful for predict-

25. *Chemical Technology*

ing ion-exchange column performance. Tables and graphs. 10 ref.

12421* Classification of Bitumens in Asphalt Technology by Certain Rheological Properties. Part. IV. Criticism of Certain Established Fluidity Factors and Derivation of More Rational Indices. S. L. Neppe. *Journal of the Institute of Petroleum*, v. 38, June 1952, p. P458-P471.

Inherent errors in the Fluidity Index of Holmes, Collins, and Child are pointed out, and the method is modified to remove certain irregularities. In addition to other limitations, the Zapata Fluidity Factor is shown to be radically unsound, being affected to a far greater extent by hardness than by quality of the bitumens. Analytical data for numerous samples are presented. 10 ref.

12422* Solvent Extraction of Phenol From Coal-Tar Hydrocarbons: The Use of Glycerol, Triethylene Glycol and Their Aqueous Solutions as Solvents. A. P. C. Cumming and F. Morton. *Journal of Applied Chemistry*, v. 2, June 1952, p. 314-323.

Tenary solubility data for the systems glycerol-phenol-hydrocarbons and triethylene glycol-phenol-hydrocarbons at 20, 40, and 60°C. and phase-equilibrium data for the same systems are presented.

12423* Low-Temperature Production of Oxidized Oil Gels. F. T. Walker and T. McKay. *Journal of Applied Chemistry*, v. 2, June 1952, p. 344-352.

The two main processes of oxidizing the oil, the scrim and the mechanical, are reviewed. It is shown that the rate of oxidation obtainable at any temperature increases in direct proportion to the air/oil interface. A new process is described, in which the oxidation apparatus is a randomly packed column wherein a constantly flowing thin film of oil is oxidized by a countercurrent stream of hot air. 20 ref.

12424* *Journal of Applied Chemistry*, v. 2, Supplementary Issue, No. 1, 1952, 68 pages.

Papers read at Conference on Fluidization Technology, June 12-13, 1952: "Problems of Plant Design for Fluidized Processes," S. A. Gregory; "Some Fundamental Characteristics of the Fluidized State," C. van Hearden; "An Experimental Study of the Mechanism of Fluidization," René Fottrand; "Heat Transfer Between Fluidized Beds and Vertically Inserted Tubes," H. A. Vreedenberg; "Some Practical Applications of Fluidization," P. Evans and H. Kepper; "A Theory of Fluidization and Its Application to Gas Purification," J. E. Garside and A. L. Roberts; "Some Observations on Fluidization as Applied to the Fischer-Tropsch Process," C. C. Hall and P. Crumley; "Hydrodynamic Relationship in Particulate Fluidization," R. F. Young; "Fluidization in Beds of Coal and Coke Particles: Some Effects of Size of Particles and Viscosity, Density and Velocity of Gas," L. F. Folley and F. E. Stantan.

12425* Fiberboard and Fiber-Chip Boards. (German.) R. E. Vogel. *Kunststoffe*, v. 42, June 1952, p. 165-168.

Discusses and illustrates the production of sheets of structural material from wood fibers and chips. Physical properties are tabulated.

12426* Influence of Temperature and Moisture on the Electrical Properties of Leather. Charles E. Weir. *Journal of Research of the National Bureau of Standards*, v. 48, May 1952, p. 349-359.

Apparent, or bulk, dielectric constants and power factors of chrome and vegetable leather and untanned hide are reported for moisture contents up to 30% at temperatures of 23 and 70°C. over the frequency range 0.75-96 Kc. Results indicate that electrical measurements in this frequency range are probably not reliable for precise quantitative moisture analyses. 47 ref.

12427* Here's a New Type of Distillation, Absorption, and Extraction Column. M. R. Cannon. *Oil and Gas Journal*, v. 51, July 28, 1952, p. 268, 271, 318, 320.

Describes design of a jet contractor which, in utilizing the principles of fluid dynamics, provides more intimate mixing of liquid and vapor on trays in columns used for separation processes. Schematic diagrams.

12428* How to Rid Natural Gas of Undesirable Sulfur Compounds. Leroy Culbertson and J. S. Connors. *Oil and Gas Journal*, v. 51, Aug. 11, 1952, p. 114-115, 117.

Various processes are tabulated, discussed, and illustrated by flow diagrams.

12429* Chemical Engineering in Alkyd Resin Manufacture. Stanley Yokell. *Paint and Varnish Production*, v. 42, Aug. 1952, p. 23-27, 51.

Describes and illustrates equipment and procedures.

12430* Behavior of Paper Under Stress. Geoffrey Broughton. *Paper Industry*, v. 34, July 1952, p. 482-485.

Discusses test equipment and procedures. Typical results are charted.

12431* New Hardboard Mill in Oregon. *Paper Mill News*, v. 75, Aug. 9, 1952, p. 11-15.

Detailed illustrated description of the Lighthall-Anderson Process for hardboard manufacture. Process employs entire output of waste slabwood from Douglas fir mill operations, and is modifiable to include the use of 4 other slabwoods.

12432* Forming Optical Handsheets of Eucalypt Groundwood With Stainless Steel Filter. J. L. Somerville and A. J. Pearson. *Paper Trade Journal*, v. 135, July 18, 1952, p. 45-46.

Gives details of paper-laboratory test procedure for the above.

12433 Catalytic Cracking in Airlift TCC Units. W. W. Hamilton, S. C. Eastwood, A. E. Potas, and Schraishuhn. *Petroleum Engineer*, v. 24, Aug. 1952, p. C5-C8, C-10, C-13-C14, C-16.

Five schemes show how process can be applied to most refining processing situations. Flow diagrams and tables.

12434 Shell Extractive Distillation Process for Recovery of High-Purity Aromatics. C. L. Dunn and G. E. Liedholm. *Petroleum Engineer*, v. 24, Aug. 1952, p. C7-C10.

Above process is described and discussed. Numerous graphs, tables, and flow diagrams.

12435 Low Temperature Gasoline Plants. Charles W. Hayes. *Petroleum Engineer*, v. 24, Aug. 1952, p. C41-C46.

Discussion of gas processing at lease operations. Lists and discusses economic considerations for low-temperature gasoline plants. Numerous flow diagrams, tables, and graphs.

12436 Detergents from Petroleum. Foster Dee Snell. *Petroleum Processing*, v. 7, July 1952, p. 982-986.

Describes at length, the processing of alkyl aryl sulfonate synthetic detergents, in which the hydrocarbon group is based on readily available petroleum fractions rather than on the more expensive vegetable oils. Considers properties of "syndets," molecular structure, advantages and disadvantages of alkyl aryl sulfonates, production, processing procedures, and advantages and disadvantages of nonionic detergents.

12437 Improved Process Polymerizes Olefins for High-Quality Gasoline. G. E. Langlois and J. E. Walkey. *Petroleum Refiner*, v. 31, Aug. 1952, p. 79-83.

Tells how polymerization of light olefins is aided by a phosphoric-acid-on-quartz catalyst. The polymer is a 98-octane gasoline. Flow diagram and graphs.

12438 Fractionation Calculations Made Easier and Faster. E. N. Pennington, F. H. Poetmann, and K. H. Hachmuth. *Petroleum Refiner*, v. 31, July 1952, p. 103-107.

Presents a graphical correlation of data and demonstrates its application to fractionation design problems for both binary and multicomponent systems. Tables and chart. 10 ref.

12439 Extractive Crystallization—A New Separation Process. Part III. Practical Applications. Kenneth A. Kobe and William G. Domask. *Petroleum Refiner*, v. 31, July 1952, p. 125-129.

Part III includes practical applications and a description of the new process which is based on urea and thiourea complex formation. Flow diagrams, table, and graphs.

12440 Dehydration of Natural Gas and Light Hydrocarbon Liquids. Part I. Principles of Dehydration. John M. Campbell

and Lawton L. Laurence. *Petroleum Refiner*, v. 31, Aug. 1952, p. 65-70.

First of a series is limited to a basic discussion of the mechanics of dehydration. 157 ref.

12441 Applied Distillation. Part I. Fundamentals. K. E. Coulter. *Petroleum Refiner*, v. 31, Aug. 1952, p. 95-103.

First of a series of 4 articles intended to give the reader the high points of distillation. The articles are confined as much as possible to the practical aspects. Literature references are given. Whenever possible, examples are given from actual plant operations.

12442 Analytical Solution for Crowded Ends of McCabe-Thiele Diagram. Robert G. Blick. *Petroleum Refiner*, v. 31, Aug. 1952, p. 105-107.

When the McCabe-Thiele method is applied to precise fractionations, the graphical construction at the ends of the diagram become too crowded to work with. Presents a simple analytical method for obtaining the number of plates in these crowded regions. No new theories are presented, but formulas are derived and recorded for ready application.

12443 How Charge Stock Properties Affect Carbon Deposition in Catalytic Cracking. C. A. Duval and L. S. Holmes. *Petroleum Refiner*, v. 31, Aug. 1952, p. 109-111.

Alignment chart yields "coke factor" from 4 physical properties of the stock.

12444* Thermal Polymerization of Linseed Oil. C. Boelhouwer, A. C. Jol, and H. I. Waterman. *Research*, v. 5, July 1952, p. 336-338.

Describes the analysis of three stand oils of different viscosity, obtained by above process for periods of 6, 6.5, and 7 hrs. at 300°C. in a nitrogen atmosphere.

12445 The Role of the Hemicelluloses in the Mechanism of Wet Strength. Manuel N. Fineman. *Tappi*, v. 35, July 1952, p. 320-324.

Major factor in the mechanism of wet strength is shown to be the insolubilization and reinforcement of the hemicellulosic constituents by the wet-strength additives. The mechanisms of tear strength and of softness in paper are also considered in terms of the role played by the hemicelluloses. Conditions which may promote improvements in these properties are suggested. Graphs and tables. 35 ref.

12446* Coating Ingredients from Tall Oil. J. W. Eldridge and M. G. Selden. *Tappi*, v. 35, July 1952, p. 134A-135A.

Discusses preparation of modern vehicles, influence of resins, tall-oil-vehicle design, oil length, defects, and acceptable vehicles.

12447* Atomic Energy Harnessed to Inspect Coated Fabrics. *Textile Industries*, v. 116, Aug. 1952, p. 102-103.

Describes use of β-ray gages made by Industrial Nucleonics Corp., Columbus, Ohio, to inspect plastic-coated fabric as it emerges from calendering machines. The gages weight the amount of plastic which has been applied to the fabric, giving a fast, accurate check on the quality of production.

12448* Studies on Melamine. I. Influence of Impurities on Direct Preparation of Melamine from Calcium Cyanamide. II. Synthesis of Melamine From Dicyandiamide by the Solvent Method. III. Synthesis of Melamine From Dicyandiamide by Means of Liquid Ammonia Under Pressure. IV. The Reaction Mechanism of the Formation of Melamine From Dicyandiamide. (English.) Yoshibumi Oshima. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Feb. 1951, p. 118-132.

Miscellaneous Publications

12449 The Application of Chromatography to the Paper Industry. A. F. Williams. *Proceedings of the Technical Section, British Paper and Board Makers' Association*, v. 33, Feb. 1952, pt. 1, p. 85-101; disc., p. 102-106. (TS1080 P19p)

Covers development of cellulose adsorbents with examples of applications to the inorganic constituents of paper; role of paper as a chromatographic adsorbent; and applications of chromatography to organic separations. 20 ref.

Books

12450* An Introduction to Textile Bleaching. J. T. Marsh. 512 pages. 1948. John Wiley & Sons, New York. (TP893 M35i)

Concerned with the occurence and properties of the various textile fibres and methods adopted for their purification. Chief aim is to help the younger technologists. Arranged in 6 parts, covering: the textile fibers, wetting and detergency, scouring and bleaching, drying, and tests for damage. Illustrations and brief bibliography.

12451 Materialy Maslianoi Zhivopisi. (Materials for Oil Painting.) A. V. Vinner. 522 pages. 1950. Government Publishing House for "Art," Moscow, U. S. S. R. (ND1500 V76m)

A technical reference book on all questions concerning the history and technology of the above, i.e., bases, prime coats, oils, paints, diluents, and binders. Also deals with problems arising during painting, as well as those observed upon completion (darkening, crumbling of the coating, etc.) Drawings, tables, a bibliography, and a general index are included.

12452 Pulp and Paper Manufacture. Vol. 1. Preparation & Treatment of Wood Pulp. Vol. 2. Preparation of Stock for Paper Making. Ed. 1. J. Newell Stephenson, editor-in-chief. 1043 and 587 pages. 1950 and 1951. McGraw-Hill, New York. (TS1105 J66p)

First volumes of a 4-volume treatise, based on the 3rd edition of Vols. III-IV of "The Manufacture of Pulp and Paper." Chapters are by authors who have specialized in different phases of paper manufacture.

12453 The Utilization of Sugar Cane Bagasse for Paper, Board, Plastics, and Chemicals. Ed. 2. Clarence J. West. 200 pages. 1952. Sugar Research Foundation, Inc., New York. (Technological Report Series No. 8) (Z7914.P2)

Annotated bibliography.

12454 Modern Chemical Processes. Vol. II. 299 pages. 1952. Reinhold Publishing Corp., New York. (TP155 M72)

A compilation of 24 plant-process articles, published in *Industrial and Engineering Chemistry*, under the general title of "Staff-Industry Collaborative Reports."

12455 Proceedings Wrightsville Beach Marine Conference. 59 pages. 1951. National Academy of Sciences—National Research Council, Washington, D. C. (VM600 W93p)

Symposium primarily on the marine-borer problem in relation to wood deterioration, with one paper on concrete piles and their protection. Tables, diagrams, photographs, and references.

12456 Review of Textile Progress. 482 pages. 1951. Textile Institute, Manchester, England; and Society of Dyers and Colourists, Bradford, England. (TS1449 R32)

Literature reviews by various contributors under 10 main headings and 24 subheads. Extensive footnote references.

See also:

11952 (cathodic protection in chemical engineering)
11995 (products of oxidation of coal)
12052 (sulfur in oil shale)
12070 (petroleum chromatography)
12090 (identification of textile materials—book)
12221 (treatment of pulp and paper mill effluents)
12337 (magnesia from seawater)
12346 (manufacture of paper from glass fibers)
12516 (separation of liquid hydrocarbons)
12583 (plastics for chemical plant equipment)
12586 (plastics in chemiacl plant)
12621 (thermoplastic fiber bonded fabrics)
12669 (sorbitol additions to tall-oil esters)
12726 (preservation and chemical utilization of wood)
12938 (outlook for chemicals—PMPC report)
12939 (phosphorus developments)

26. CHEMISTRY—GENERAL, INORGANIC, AND PHYSICAL

12457* The Crystal Structure of Diphenyl Diselenide. (English.) Richard E. Marsh. *Acta Crystallographica*, v. 5, July 1952, p. 458-462.

Above was determined by analysis of rotation and Weissenberg

26. *Chemistry—General, Inorganic, and Physical*

photographs about the *b* and *c* axes. Positional parameters for the Se and C atoms were assigned from Fourier projections on (001) and (010); the Se parameters were then refined by least-squares calculations. Tables. 11 ref.

12458* The Powder Diffraction Intensities of Graphite for X-Rays and Neutrons. (English.) G. E. Bacon. *Acta Crystallographica*, v. 5, July 1952, p. 492-499.

Measuremnets are reported of the powder-diffraction intensities of graphite for both x-rays and neutrons, with allowance for crystalite orientation, thermal vibrations, and the rhombohedral modification. Tables and graphs. 20 ref.

12459* Optical and X-Ray Data on a Group of Isostructural Uranium and Plutonium Compounds. (English.) Eugene Staritzky and Joseph Singer. *Acta Crystallographica*, v. 5, July 1952, p. 536-540.

A group of isostructural compounds of hexavalent and tetravalent U and Pu with tetraethyl and tetramethyl ammonium chloride were characterized by their optical properties and by x-ray diffraction analysis. Some errors in earlier data were corrected and explained. 10 ref.

12460* Studies Relating to Boron. V. Chemistry of the Dibutylboron Group. Robert W. Auten and Charles A. Kraus. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3398-3401.

12461* Iodide-Ion Catalysis of the Elimination of Iodine From *trans*-Diiodoethylene and of the Addition of Iodine to Acetylene. Sidney I. Miller and Richard M. Noyes. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3403-3406.

Graphs. 15 ref.

12462 Preparation and Physical Properties of Niobium Pentafluoride. J. H. Junkins, R. L. Farrar, Jr., E. J. Barber, and H. A. Bernhardt. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3464-3466.

12463 Phase Transitions in Surface Films on Solids. R. Nelson Smith. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3477-3479.

Published isotherms of n-heptane on Fe_2O_3 and graphite were redetermined using a gravimetric method and McLeod gage. 17 ref.

12464 The Mechanism of Decomposition of Borine Carbonyl. Anton B. Burg. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3482-3485.

Experimental results on the determination of equilibrium constants and rates of decomposition. Graphs, tables, and apparatus diagram.

12465 On the Bonding in Electron Deficient Compounds of Boron. Kenneth Hedberg. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3486-3489.

The nature of the above is discussed with reference to their intermediate position as a class between ordinary covalent compounds and the metals. Data are compiled for B and 15 B compounds. 27 ref.

12466 Magnetic Susceptibility of the Lithium Tungsten Bronzes. Lawrence E. Conroy and M. J. Sienko. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3520-3522.

A number of the above differing in Li concentration were prepared and their magnetic moments determined by the Gouy method. The molar susceptibility of WO_3 was also determined. Tables. 11 ref.

12467 Microwave Absorption and Molecular Structure in Liquids. VIII. Dielectric Relaxation in Some Long-Chain Esters. P. L. McGeer, A. J. Curtis, G. B. Rathmann, and C. P. Smyth. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3541-3545.

Refractive indexes, densities, and viscosities were also measured. Tables and graphs. 15 ref.

12468 The Reaction Between Niobium Pentachloride and Niobium Metal. C. H. Braubaker, Jr. and R. C. Young. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3690-3693.

12469 Observations on Curium Valence States; A Rapid Separation of Americium and Curium. S. E. Stephanou and R. A. Penneman. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3701-3702.

12470 Toluene-Soluble Copper and Silver Fluoborates, Decomposition of Diazonium Fluoborates. James C. Warf. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3702-3704.

21 references.

12471 Vapor-Liquid Equilibrium. VIII. Hydrogen Peroxide—Water Mixtures. George Scatchard, George M. Kavanagh, and Leland B. Ticknor. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3715-3720.

Equilibrium vapor pressure and compositions of above were measured over whole range of composition at 60, 75, and 90°C. and for approximately equimolal mixtures at 45 and 105°C. in an improved still. Values of compositions and thermodynamic properties were derived. Considers also association, polymerization, and bond energy. Apparatus diagram, table, and graphs.

12472 Heats of Mixing in Some Non-Electrolyte Solutions. George Scatchard, Leland B. Ticknor, J. Rex Goates, and Eric R. McCartney. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3721-3724.

A simple calorimeter is described and data given for enthalpy of mixing of several binary and ternary mixtures. Apparatus diagram, graph, and tables. 25 ref.

12473 Electrochemical Properties of Ion Exchange Resins. I. Donnan Equilibria, Membrane Potentials and Conductivities. W. Juda, N. W. Rosenberg, J. A. Marinsky, and A. A. Kasper. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3736-3738.

Study of sodium salts of two chemically-different cross-linked polyphenol-sulfonic acids. Theoretical discussion. Graphs. 15 ref.

12474 Measurements on the Equilibrium Bteween Hydrazine and Water in the Vapor Base. David Altman and Barnet Adelman. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3742-3744.

Equilibrium constants studied in a constant-volume apparatus. Equation given and thermodynamic constants obtained. Graphs.

12475 A New Boron Base, $Na_2HB(CH_3)_2$. Anton B. Burg and George W. Campbell. Jr. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3744-3748.

Preparation, properties, and reactions. Apparatus diagrams and table. 10 ref.

12476 Citrate Complexes of Copper in Acid Solutions. R. W. Parry and F. W. DuBois. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3749-3753.

A study to identify the above and determine their stability constants. Graphs and tables.

12477 The Electrokinetics of Hydrogen Evolution. III. Hydrogen Overvoltage at Electrodeposited Copper Cathodes. William P. Senett and C. F. Hiskey. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3754-3760.

Includes overvoltage measurements as a function of current density and temeprature, and a study of time variations. Theory. Tables, graphs, and apparatus diagram. 14 ref.

12478 Heat Capacities at Low Temperature and Entropies at 298.16°K. of Orthotitanates of Barium and Strontium. S. S. Todd and R. E. Lorenson. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3764-3765.

Temperature range, 51-309°K. Data also for the equimolal solid solution. Tables.

12479 The Vaporization of Graphite Filaments. Milton Farber and Alfred J. Darnell. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3941-3942.

Rate of weight loss was measured in vacuum and used to derive expressions for vapor pressure and heat of sublimation. Table and graph.

12480 Thermodynamic Functions of Adsorbed Molecules from Surface Tension Measurements: Toluene, Benzene and n-Heptane on Mercury. Terrell L. Hill and Charles Kemball. *Journal of the American Chemical Society*, v. 74, Aug. 5, 1952, p. 3946-3948.

Calculation of energy, entropy, and surface concentration of above compounds from previously reported data. Graphs. 11 ref.

12481* Temperature and Heat Reaction Calibration of the Differential Thermal Analysis Apparatus. Issac Barshad. *American Mineralogist*, v. 37, July-Aug. 1952, p. 667-694.

Differential thermal curves representing one or several substances of known melting or inversion points, and of known heats of fusion or decomposition, are proposed as a means for direct temperature and heat-of-reaction calibration of above apparatus. The heat-of-reaction calibration enables direct determination of the heat quantities involved in desorption or sorption of liquids on clay minerals. 12 ref.

12482* A Method of Correlating Heat-Transfer Data for Surface Boiling of Liquids. W. M. Rohsenow. *Transactions of the American Society of Mechanical Engineers*, v. 969-975; disc., p. 975-976.

A method based on a logical explanation of the mechanism of heat transfer associated with the boiling process is presented for correlating heat-transfer data for nucleate boiling of liquids for the case of pool boiling. Numerous graphs.

12483* A Study in Continuous Zone Electrophoresis in Filter Paper. (English.) Inger Brattsten and Anna Nilsson. *Arkiv för Kemi*, v. 3, no. 4, 1951, p. 337-345.

An apparatus for fractionation according to above method is described. The separation takes place in sheets of filter paper clamped between glass plates. Circulating water is used to cool the apparatus. Resolution obtainable was tested in separation experiments with substances of known mobilities. A mixture of glycine, alanine, and glycylglycine in acid medium, and a mixture of serum albumin and γ-globulin in neutral medium were used.

12484* X-Ray Investigations on $BiNbO_4$, $BiTaO_4$ and $BiSbO_4$. (English.) Bengt Aurivillius. *Arkiv för Kemi*, v. 3, nos. 2-3, 1951, p. 153-161.

Results of experiments and calculations tabulated and discussed.

12485* The Crystal Structure of $CsSb_2F_7$. (English.) Anders Byström and Karl-Axel Wilhelmi. *Arkiv för Kemi*, v. 3, no. 4, 1951, p. 373-380.

Results of investigation are tabulated and compared with those for similar compounds.

12486* The Distribution of Uranyl Nitrate Between Organic Solvents and Water. R. K. Warner. *Australian Journal of Applied Science*, v. 3, June 1952, p. 156-172.

Experimental results for a number of solvents and certain addition materials. Tables and graphs. 11 ref.

12487* Volumetric Behavior and Thermodynamic Properties of Ethylene Oxide. C. J. Walters and J. M. Smith. *Chemical Engineering Progress* (Engineering Section), v. 48, July 1952, p. 337-343; disc., p. 343.

Available spectroscopic information was combined with volume data to determine enthalpy and entropy values in the 2-phase and gaseous regions. Results are charted and tabulated. 48 ref.

12488 Colloid Science: A Chapter in Chemistry. Eric Rideal. *Journal of the Chemical Society*, July 1952, p. 2479-2487.

An address.

12489 Hydrated Calcium Silicates. Part IV. Hydrothermal Reactions: Lime-Silica Ratios 2-1 and 3-1. L. Heller and H. F. W. Taylor. *Journal of the Chemical Society*, July 1952, p. 2535-2541.

Hydrothermal reactions were carried out at 100-200°C. with mixtures of lime and silica gel in the molar ratio 2:1, and also with β-and γ-Ca_2SiO_4 and Ca_3SiO_5. Results tabulated and discussed.

12490* Determination of the Composition of Solutions by Means of Temperature-Independent Density Measurements. (German.) R. Wickbold. *Chemie-Ingenieur-Technik*, v. 24, July 1952, p. 403-404.

Describes use of Neubauer "aerometer" for the above. Data for fuming H_2SO_4 illustrate the procedure.

12491* Study on the Solidification of Germanium Tetrachloride and Germanium Tetrabromide, Before, During, and After Exchange Reactions Resulting in Germanium Chlorobromides. (French.) Marie-Louise Delwaulle. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 9, 1952, p. 2361-2363.

12492* Some Reactions in the Solid State, Studied by Means of Infrared Absorption Spectra. (French.) Clément Duval and Jean Lecomte. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 16, 1952, p. 2445-2447.

Describes some examples of the above which indicate that infrared absorption spectra make it possible to ascertain whether a solid-state reaction takes place between two constituents, or whether only a simple physical juxtaposition takes place.

12493* The Retention of Water Vapor by Alumina and Silica. (French.) Denis Papée. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 23, 1952, p. 2536-2538.

Describes the above process, showing its dependence upon surface structure of the material. Various phases of the process are characterized. Data are tabulated.

12494* The Reactions of Germanium. (French.) Pierre Bevillard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 30, 1952, p. 2606-2608.

Reports on investigations on the behavior of the pH of solutions of germanium oxides in the presence of o-diphenols. Results are discussed.

12495* Computation of Heats of Vaporization. (German.) F. Florin. *Forschung auf dem Gebiete des Ingenieur-Wesens*, v. 18, sec. B, no. 2, 1952, p. 36-44.

Describes modification of the Clausius-Clapeyron equation for the above. Develops simple approximation formula for application to n-paraffins. Tables and graphs. 13 ref.

12496 The Reaction Between Methane and Steam in the Temperature Region 1000° to 1100°C. Alvin S. Gordon. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1857-1859.

Results show that the above reaction is probably a combination of the decomposition of CH_4 followed by the steam-carbon reaction. Until carbon is formed as a result of the decomposition, steam behaves as an inert gas. Production of synthesis gas from CH_4 and steam for the Fischer-Tropsch process procedes smoothly at about 900°C. on a nickel catalyst. Without an efficient catalyst, at considerably higher temperatures, there is no problem of decomposing CH_4, but gasification of the resulting carbon is very slow.

12497 Composition of Vapors From Boiling Binary Solutions. Pressure Equilibrium Still for Studying Water—Acetic Acid System. Donald F. Othmer, Sal J. Silvis, and Albert Spiel. **Binary and Ternary Systems of Acetone, Methyl Ethyl Ketone, and Water.** Donald F. Othmer, Manu M. Chudgar, and Sherman L. Levy. *Industrial and Engineering Chemistry*, v. 44, Aug. 1951, p. 1864-1881.

Gives details of construction and operation of above apparatus and of results obtained with systems indicated. 58 ref.

12498 Studies in High Vacuum Evaporation. The Falling-Stream Tensimeter. K. C. D. Hickman and D. J. Trevoy. **Projective and Equilibrium Vapor-Liquid Relationships for Two Binary Systems Over and Extended Range.** D. J. Trevoy. **Surface Behavior in the Pot Still.** K. C. D. Hickman. **Comparison of High Vacuum Stills and Tensimeters.** K. C. D. Hickman and D. J. Trevoy. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1882-1911.

The advance of high-vacuum distillation has left a number of phenomena unexplained or without precise measurements.

26. *Chemistry—General, Inorganic, and Physical*

Among these is the refusal of liquids to evaporate in pot stills at their appropriate temperatures and pressures, which results in bumping and spasmodic distillation. Evaporation coefficients of liquids under such conditions are thus variable, anomalous, and generally less than unity. Similar variable and low coefficients have been reported at higher pressures. The concept developed is that clean, new surfaces which are older and perhaps contaminated, evaporate at lesser rates. Temperature, pressure, rate, and composition relationships of test mixtures over an extended range in both projective and equilibrium tensimeters were investigated. When liquids are permitted to evaporate rapidly and without restriction into a high vacuum, their surfaces often separate into two zones of widely different appearance and properties. One, which is in rapid self-motion, is called "working," and the other, which is quiet and highly reflecting, is called "torpid." The dual or "schizoid" condition is the usual habit and there is a well-defined barrier between the two kinds of surface. Schizoid phenomena were studied with an evacuated flask, warmed from below and cooled above, which became a molecular pot still under total reflux. Numerous diagrams, graphs, tables, and photographs. 66 ref.

12499* Investigations on the Determination of Kinematic Viscosity Using IP Standard Methods. *Journal of the Institute of Petroleum,* v. 38, June 1952, p. 428-444.

Deals with cooperative experimental investigation of the possibility of using master viscometric measurements on a single value of viscosity as a primary standard; the possibility of using master viscometers based solely on the primary standard viscosity; use of master viscometers and present IP standard viscometers to evaluate oils in the viscosity range 1-2000 cs. by a stepping-up procedure; and determination of the reproducibility of viscosity determinations at different levels of viscosity.

12500* Three-Dimensional Space Representation of Free Energy in Ternary Systems. (Swedish.) Erik Rudberg. *Jerkontorets Annaler,* v. 136, no. 5, 1952, p. 91-112.

The general properties of the Gibbs' free-energy function for ternary systems are discussed, particularly in relation to geometric representation as a series of single-phase curved surfaces suspended above the composition triangle. It is emphasized that the various equilibrium charactertistics of such systems, and the trend of reactions in non-equilibrium situations, are governed by the downward convexity exhibited by these surfaces over stable phase regions.

12501* Anodic and Potentiometric Preparation of Nickel "Peroxide." (French.) M. Haissinsky and M. Quesney. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 49, May 1952, p. 302-307.

Describes optimum conditions for obtaining anodic deposits of NiO_2 on various electrodes on the basis of the literature. Proposes an interpretation of various results. 23 ref.

12502 Measurements of the Physical Properties of Active Nitrogen. James M. Benson. *Journal of Applied Physics,* v. 23, July 1952, p. 757-763.

Measurements were made of the heat released during decay of afterglow, viscosity, and free electron density in active nitrogen. Ionization in a stream of active nitrogen is shown to be incidental rather than essential to production of Lewis-Rayleigh afterglow.

12503 Application of Eller's Optical Machine to the Determination of the Molecular Structure of Gases by Electron Diffraction. L. Bru, M. Pérez Rodriguez, and M. Cubero. *Journal of Chemical Physics,* v. 20, July 1952, p. 1069-1070.

Presents a new application of above machine which allows one to reduce extraordinarily the time for calculations required by the trial-and-error method. Application to the chloride monoxide molecule is described.

12504 Polarization in Electrolytic Solutions. Part I. Theory. Hung-Chi Chang and George Jaffé. **Polarization in Electrolytic Solutions. Part II. Measurements.** George Jaffé and John A. Rider. *Journal of Chemical Physics,* v. 20, July 1952, p. 1071-1087.

The theory of conductance in polarizable media developed by one of the authors is modified in such a way as to be applicable to electrolytic solutions. This is achieved by the introduction of a new set of boundary conditions. It is assumed that discharge at electrodes is a rate process of the first order, characterized by a rate constant. In Part II "polarization capacitance" and the "excess resistance" of electrolytic solutions were measured over wide ranges of frequency and concentration, and for different plate distances. Also the material of the electrodes was modified, and some temperature coefficients were measured. 17 ref.

12505 Temperature Dependence of the Viscosity of Associated Liquids. Theodore A. Litovitz. *Journal of Chemical Physics,* v. 20, July 1952, p. 1088-1089.

By assuming that the activation energy for flow in associated liquids is proportional to the inverse square of the absolute temperature, an empirical expression for the viscosity is obtained, which fits the data well. An emprirical expression for the activation energy of mixtures of associated liquids is also proposed.

12506 The Time Dependence of the Potential in Electrode Reactions. William R. Busing and Walter Kauzmann. *Journal of Chemical Physics,* v. 20, July 1952, p. 1129-1143.

An experimental study was made of the potential accompanying the evolution of oxygen from 1N KOH at a Pt anode. When the current was held constant, the potential increased slowly with time. When the current was interrupted the potential rapidly decreased, the decay being faster the higher the initial potential. Tafel constants were found to depend very much on time and on current density. Behavior of the potential on increasing or decreasing the current was studied. 30 ref.

12507 An Analysis of the Pressure Dependence of the Dielectric Constant of Polar Liquids. I. S. Jacobs and A. W. Lawson. *Journal of Chemical Physics,* v. 20, July 1952, p. 1161-1164.

Onsager and Kirkwood theories of polar liquids were used to analyze available experimental data on the above. Quantitative estimates of these two factors are given, and their influence on binding energy and compressibility is discussed. 11 ref.

12508* Effect of Shear Temperature on Viscosity in a Rotational Viscometer Measurement. Ruth N. Weltmann and Perry W. Kuhns. *Journal of Colloid Science,* v. 7, June 1952, p. 218-226.

A method is described which permits determination of approximate temperature distribution over the cross-sectional area of a Newtonian material subjected to shearing forces in a rotational viscometer. By correlating change of viscosity to temperature increases, and by determining actual viscosity value as found in the rotational viscometer, the effect of thixotropy can be studied. Temperature calculations with regard to an Oronite polybutylene oil and a silicone fluid are made.

12509* The Band Viscometer. Harry H. Hull. *Journal of Colloid Science,* v. 7, June 1952, p. 316-322.

Describes band viscometer similar to that of Wachholtz and Asbeck. It was found useful in evaluating the consistencies of non-Newtonian materials particularly at higher rates of shear and where large numbers of tests must be run.

12510* Oxygen Depolarization Currents on Platinum Electrodes. (German.) H. Grubitsch. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, no. 3, 1952, p. 549-567.

Reports experimental results on the effect of O_2 concentration on the feed current of an element composed of an nonpolarizable anode and a Pt electrode in an air-saturated electrolyte of different pH value. Graphs and tables. 38 ref.

12511* Gas Adsorption at High Pressures. (German.) G. F. Hüttig and O. Theimer. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, no. 3, 1952, p. 650-663.

Presents critical theoretical analysis of above, including the "BET" theory and some of its modifications. 19 ref.

12512* Mechanism and Kinetics of the Oxidation of Iodine Ions by Oxygen. (German.) E. Abel. *Monatshefte für Chemie und verwandte Teile anderer Wissenchaften*, v. 83, no. 3, 1952, p. 818-828.

Shows that oxidation of HI by O_2 differs from most similar oxidizing processes in that the oxidizing rate increases with acidity and that the oxidation product, iodine, catalytically accelerates the rate of oxidation. A mechanism which explains these two characteristics is described. Tables and graphs. 16 ref.

12513 Heterogeneous Equilibria at the Glass Electrode-Solution Interface. Donald Hubbard and Richard G. Goldman. *Journal of Research of the National Bureau of Standards*, v. 48, June 1952, p. 428-437.

Results of experimental investigation are charted, tabulated, and discussed. 28 ref.

12514 Determination of Crystal Structure by Optical Diffraction Methods. C. A. Taylor. *Nature*, v. 169, June 28, 1952, p. 1086-1088.

Reviews the merit of the above in its application to new problems. Illustrated by application to 5 complex organic compounds. Compares optical diffraction and x-ray Fourier synthesis. Diagrams.

12515 Direct Calculation of Viscosities of Liquids. M. S. Telang. *Nature*, v. 170, July 26, 1952, p. 160-161.

A method for the above calculation is described. The viscosity equation developed is applied to CH_4 and CCl_4 and results tabulated.

12516 Silica Gel Adsorption for Separation of Liquid Hydrocarbons. E. K. Seybert. *Petroleum Processing*, v. 7, Aug. 1952, p. 1150-1153.

Surveys technology and applications of the above. 25 ref.

12517* Thermodynamic Argument Corner. Neil P. Bailey. *Power*, v. 96, Aug. 1952, p. 94-97, 208, 210.

Progress report on the reaction of some workers in fields of thermodynamics and fluid mechanics to revisions proposed in Mar. issue by Neil P. Bailey.

12518* Transport Control in Heterogeneous Reactions. L. L. Bircumshaw and A. C. Riddiford. *Quarterly Reviews*, v. 6, 1952, p. 157-185.

96 references.

12519* The Energetics of Reactions Involving Hydrogen Peroxide, Its Radicals, and Its Ions. M. G. Evans, N. S. Hush, and N. Uri. *Quarterly Reviews*, v. 6, 1952, p. 186-196.

17 references.

12520* Titration Curves of Dialysed Clay Minerals. (English.) J. Van Schuylenborgh and G. J. Vervelde. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, June 1952, p. 609-622.

Titration experiments were carried out on dilute suspensions of dialyzed samples of 3 clay minerals: kaolinite, illite, and bentonite. The titration curves were analyzed on the basis of a theory describing the clay suspensions as a system of two solutions, one containing the clay acid and the other being responsible for the activities measured.

12521* The Iron-Chlorine System. II. The Equilibrium of the Reaction $FeCl_2$ (Gas) + H_2 = Fe + 2HCl. (German.) Harald Schäfer and Kurt Krehl. *Zeitschrift für anorganische und allgemeine Chemie*, v. 268, nos. 1-2, 1952, p. 35-46.

Includes thermodynamic computation of reactions of α-, β-, and γ-iron and $FeCl_2$. Graphs, and tables. 19 ref.

12522* The Problem of Producing Fluorine by Chemical Methods. (German.) O. Schmitz-Dumont and Paul Opgenhoff. *Zeitschrift für anorganische und allgemeine Chemie*, v. 268, nos. 1-2, 1952, p. 57-68.

Review of published methods and results of experiments show the difficulty of producing elementary fluorine by chemical means. Diagrams and tables. 11 ref.

12523* Basic Sulfates and Selenates of Zinc. (German.) Georg Denk and Wolfgang Dewald. *Zeitschrift für anorganische und allgemeine Chemie*, v. 268, no. 3, 1952, p. 169-176.

Systematic experiments proved the formation of $ZnSO_4 \cdot 3Zn(OH)_2$, $ZnSeO_4 \cdot 3Zn(OH)_2$, and $ZnSeO_4 \cdot Zn(OH)_2$ by means of titration of zinc-salt solutions with NaOH. Tables and graphs. 13 ref.

12524* A New Method of Producing Metal Borides of the Transition Metals, Especially of Titanium and Zirconium Boride. (German.) R. Kieffer, F. Benesovsky, and E. R. Honak. *Zeitschrift für anorganische und allgemeine Chemie*, v. 268, no. 3, 1952, p. 191-200.

Shows that low-carbon TiB_2 and ZrB_2 can be commercially prepared by reacting metallic Ti or Zr with boron carbide and some anhydrides of boric acid. Some physical properties of sintered TiB_2 and ZrB_2 were determined and compared with physical properties of other diborides of transition metals. Tables, graphs, and photomicrographs. 30 ref.

12525* Contributions to the Chemistry of the Elements Columbium and Tantalum. IX. The Equilibrium Pressure of the Columbium Tetrachloride Decomposition. (German.) Harald Schäfer, Lisel Bayer, and Heimbert Lehmann. *Zeitschrift für anorganische und allgemeine Chemie*, v. 268, nos. 4-6, 1952, p. 268-278.

Decomposition into solid $CbCl_3$ and gaseous $CbCl_5$ was investigated. Apparatus is diagrammed; data are charted and tabulated. 14 ref.

12526* Investigation on the Disintegration of Potassium Chloride Sodium Chloride Mixed Crystals. (German.) Erich Scheil and Hans Stadelmaier. *Zeitschrift für Metallkunde*, v. 43, June 1952, p. 227-236.

Decribes the production of salt crystals, and measurement of their clouding during disintegration. Dependence of the clouding constant on wave length is indicated. Phenomena of disintegration of above crystals are compared to similar phenomen in alloys. Graphs and diagrams. 18 ref.

Miscellaneous Publications

12527 The FeS-FeO-SiO_2 System. Ya. I. Ol'shanskii. Henry Brutcher, Translation 2811, 9 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 70, Jan. 21, 1950, p. 245-248, 9 pages.)

Describes use of methods recently developed by the author for study of equilibria between solid phases and aggressive melts for investigation of above system. Results obtained and their confirmation by microexamination of melts. The FeS-FeO-SiO_2 phase diagram.

12528 Measurement of Gas Law Deviations With Bean and Burnett Apparatus. O. T. Bloomer. Institute of Gas Technology, Research Bulletin 13, May 1952, 12 pages. (TP700 In7r)

Deviations of 2 typical natural gases and pure N_2 were measured over the ranges 0-1000 psia., and at 48.7 and 80.1°F. Comparison of Bean and Burnett apparatus; their use and calibration. Photographs, graphs, and apparatus diagrams. 14 ref.

Books

12529 Pressure-Volume-Temperature Relationships of Organic Compounds. Ed. 3. Robert R. Dreisbach. 303 pages. 1952. Handbook Publishers, Inc., Sandusky, Ohio. (QD476 D81p3)

A reference volume for reading directly the variation of vapor pressure with temperature of a compound belonging to one of the 23 Cox Chart families, and with simple equations and their parameters for calculating accurately: rate of change of boiling point with pressure, latent heat of vaporization at any temperature, orthobaric vapor density to a reduced temperature of 0.92, and densities of liquids at various temperatures; also, for estimating critical temperatures of polar and nonpolar substances, and for accuracy of density and refractive-index determinations.

12530 Advances in Catalysis and Related Subjects. Vol. IV. W. G. Frankenburg, V. I. Komarewsky, and E. K. Rideal, editors. 457 pages. 1952. Academic Press Inc., New York, N. Y. (QD501 A95c)

Consists of the following articles: "Chemical Concepts of Catalytic Cracking", R. C. Hansford; "Decomposition of Hydro-

26. *Chemistry—General, Inorganic, and Physical*

gen Peroxide by Catalysts in Homogeneous Aqueous Solution", J. H. Baxendale; "Structure and Sintering Properties of Cracking Catalysts and Related Materials", Herman E. Ries, Jr.; "Acid-Base Catalysis and Molecular Structure", R. P. Bell; "Theory of Physical Adsorption", Terrell L. Hill; "The Role of Surface Heterogeneity in Adsorption", George D. Halsey; "Twenty-Five Years of Sythesis of Gasoline of Catalytic Conversion of Carbon Monoxide and Hydrogen", Helmut Pichler; "The Free Radical Mechanism in the Reactions of Hydrogen Peroxide", Joseph Weiss; and "The Specific Reactions of Iron in Some Hemoproteins", Philip George.

12531 The Oxidation States of the Elements and Their Potentials in Aqueous Solutions. Ed. 2. Wendell M. Latimer. 392 pages. 1952. Prentice-Hall, New York. (QD501 L34o2)

Summary of existing data. Present edition includes more extensive thermodynamic data of special significance in interpretation of inorganic chemistry; potential diagrams for all elements which have more than one oxidation state; several hundred new values; and amplified treatment of U, Np, Pu, Am, and the actinide elements. Footnote references, extensive tables, and study questions.

12532 Imperfections in Nearly Perfect Crystals. W. Shockley, J. H. Hollomon, R. Maurer, and F. Seitz, editors. 490 pages. 1950. John Wiley & Sons, New York. (QD905 N21j)

Symposium held at Pocono Manor, Pa., Oct. 12-14, 1950, to present a cross section of views and findings on imperfect crystals. The important parts of papers and discussions are summarized in 17 chapters, divided into 4 parts: On the Nature of Imperfections in Nearly Perfect Crystals; The Role of Imperfections in Deformation; Diffusion and Related Phenomena; and Properties and Effects of External and Internal Surfaces of Crystals. Selected papers are separately abstracted.

See also:

11604 (energy requirements of electric-furnace products)
11861 (heats of formation and combustion of U and Th compounds)
11885 (thermal accommodation coefficients of gases)
12034 (symposium on molecular structure and spectroscopy)
12051 (properties of SCl_2, S_2Cl_2, and mixtures)
12241 (flame spectra of organic compounds in O_2, H_2, and H_2O)
12249 (CH_4-N_2 mixtures)
12573 (tables of chemical kinetics—homogeneous reactions)
12650 (Al soap gels)
12735 (English atomic-energy chemistry research)

27. CHEMISTRY—ORGANIC

12533* The Diels-Alder Reaction Between Sorbic Acid and Substituted Styrenes. N. C. Deno and James D. Johnston. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3233-3236.

A study of the above with data on yield, properties, and structures of the adducts. Difficulties with both the polar and biradical mechanisms for the Diels-Alder reaction are presented. Tables. 19 ref.

12534* Synthesis of Esters From Olefins, Hydrogen, Carbon Monoxide and Acetic Acid. Ralph C. Schreyer. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3242-3243.

Describes above preparation. Several alcohols were also obtained by alcoholysis of the corresponding acetate esters. Tables.

12535* Hydrogen Exchange and Isomerization of Saturated Hydrocarbons With Sulfuric Acid. D. P. Stevenson, C. D. Wagner, O. Beeck, and J. W. Otvos. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3269-3282.

Describes studies of the reactions of various C_5–C_7 alkanes and cycloalkanes using deuterium as a tracer and the mass spectrometer as the analytical tool. Gives theoretical discussion; and details of the interrelationship of reactions of carbonium ions in sulfuric acid. Tables and diagrams. 14 ref.

12536* Thermal Decomposition of Sulfur Compounds. I. 2-Methyl-2-Propanethiol. II. 1-Pentanethiol. C. J. Thompson, R. A. Meyer, and J. S. Ball. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3284-3289.

Above compounds were decomposed in a quartz tube under various conditions of time and temperature with information given on products and mechanism of the decomposition. Apparatus diagrams, graphs, tables, and mass spectrograms. 10 ref.

12537* A Molecular Orbital Theory of Organic Chemistry. I. General Principles. II. The Structure of Mesomeric Systems. III. Charge Displacements and Electromeric Substituents. IV. Free Radicals. V. Theories of Reactivity and the Relationship Between Them. VI. Aromatic Substitution and Addition. M. J. S. Dewar. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3341-3363.

Tables and diagrams. 55 ref.

12538* Polarographic Behavior of Organic Compounds. XII. Relative Ease of Carbon-Halogen Bond Fission in the Iodobenzoic Acids, Phthalic Anhydrides and Phthalates. Philip J. Elving and Clifford L. Hilton. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3368-3371.

12539* The Photolysis of the Aliphatic Aldehydes. XVI. Propionaldehyde and Propionaldehyde-Iodine Mixtures. F. E. Blacet and J. N. Pitts, Jr. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3382-3388.

A mechanism is presented for the vapor phase photolysis of the above which includes 4 primary processes. Values are given for the over-all activation energies of formyl radical decomposition and of carbon monoxide formation. Tables. 24 ref.

12540* The Alkaline and Neutral Hydrolysis of 2-Methoxyethyl Iodide. William Klemperer, Law McCabe, and Bernice Sindler. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3425-3426.

A study was undertaken to determine whether or not the Hinshelwood, Laidler, and Timm theory would again predict the correct qualitative trend in activation energy for the neutral hydrolysis of another organic iodine. Tables. 13 ref.

12541 Kinetics of Bisulfite Addition to α,β-Unsaturated Compounds. Maurice Morton and Harold Landfield. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3523-3526.

A study of above for acrylonitrile, methacrylonitrile, methyl acrylate, and methyl methacrylate covers effect of pH and concentration on order of the reaction and evaluation of activation energy. Tables and graphs.

12542 Solubility of Hydrogen Chloride at Low Temperatures. A Measure of the Basic Properties of Aromatic Nuclei; π- and σ-Complexes and Their Role in Aromatic Substitution. Herbert C. Brown and James D. Brady. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3570-3582.

Apparatus diagrams, tables, and graphs. 38 ref.

12543 Alkylation of Certain Phenolic Compounds. Ed. F. Degering, Harold J. Gryting, and P. A. Tetrault. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3599-3601.

A series of alkylated cresols and chlorophenols were prepared. Physical properties are tabulated, and a special boiling liquid manometer is illustrated.

12544 The Reaction of Arylamines With Diethyl Thionothiodiformate. Ralph Sayre. *Journal of the American Chemical Society*, v. 74, July 20, 1952, p. 3647-3649.

12545* Surface and Interfacial Tensions, Viscosities, and Other Physical Properties of Some n-Aliphatic Acids and Their Methyl and Ethyl Esters. Audrey T. Gros and R. O. Feuge. *Journal of the American Oil Chemists' Society*, v. 29, Aug. 1952, p. 313-317.

22 references.

12546* Polymerization of Drying Oils. VI. Catalytic Polymerization of Fatty Acids and Esters With Boron Trifluoride and Hydrogen Fluoride. C. B. Croston, I. L. Tubb, J. C. Cowan, and H. M. Teeter. *Journal of the American Oil Chemists' Society*, v. 29, Aug. 1952, p. 331-333.

12547* The Reaction of Diethyl Malonate With Acid Anhydrides. A New Synthesis of β-diketones of the Type $ROCH_2COR$. (English.) Arne Brändström. *Arkiv för Kemi*, v. 3, no. 4, 1951, p. 365-367.

17 references.

12548* Studies on Proteins By Means of Salting-Out Curves. II. Establishment of Salting-Out Curves of Proteins by Spectrophotometric Measurement in Ultraviolet Light. (English.) Yves Derrien, Elizabeth P. Steyn-Parve, Marthe Cotte, and Georgette Laurent. *Biochimica et Biophysica Acta*, v. 9, July 1952, p. 49-55.

12549* Organo-Metallic Research in Germany; New Olefinic Syntheses via Aluminium Alkyls. *Chemical Age*, v. 67, Aug. 2, 1952, p. 161-162.

Brief summary of papers presented at a meeting of the Max Planck Research Institute, May 14, 1952.

12550 Insecticidal Activity and Chemical Constitution. Part III. A New Synthetic Route to Methyl Analogues of DDT. Part IV. Synthetic of 2:2-Di-p-Chlorophenyl-3-Methylbutane. E. John Skerrett and D. Woodcock. *Journal of the Chemical Society*, July 1952, p. 2804-2810.

12551* On Montanic Acid and Montanone. (German.) W. Presting. *Chemische Technik*, v. 4, Apr. 1952, p. 152-156.

Describes production of montanic acid, its anhydride, several of its salts, and its ketone and shows that the acid is an component of montan wax obtained from the bitumen of Central-German crude lignite. The ketone, montanone, has a setting and bonding effect on solvents. Possible uses of montanic acid are discussed. Tables and photomicrographs. 10 ref.

12552* Some Applications of Infrared Spectrometry in Steroid Chemistry. G. Papineau-Couture and Gordon A. Grant. *Chemistry in Canada*, v. 4, 1952, p. 37-41.

Practical uses are given for infrared spectrometry. The authors use examples from the field of steroid chemistry, but the principles are applicable to other classes of compounds. Illustrations show how infrared spectrometry can be used to confirm a proposed chemical structure; and as a rapid semiquantitative analytical tool.

12553 The Ionization of Paraffin Molecules. John Lennard-Jones and G. G. Hall. *Transactions of the Faraday Society*, v. 48, July 1952, p. 581-584.

Equations for the ionization potentials and molecular orbitals of long-chain paraffins are derived using the new orbital theory of valency. From these equations, numerical results were obtained for n-octane. Significance of results is discussed.

12554 The Influence of Molecular Size on the Surface Tension of Hydrocarbon Mixtures. Part 3. J. Maréchal. *Transactions of the Faraday Society*, v. 48, July 1952, p. 601-607.

The surface tension of 3 dimer-monomer solutions; diphenyl, tolan, and dibenzyl in benzene and of 1:8 diphenyloctane in benzene were measured and compared with the predictions of the Prigogine theory. Graphs and tables.

12555 Oxidation of Aldehydes in the Gaseous Phase. Part 5. The Retardation, by Alchols, of the Oxidation of Acetaldehyde. J. B. Farmer and C. A. McDowell. *Tranactions of the Faraday Society*, v. 48, July 1952, p. 624-632.

14 references.

12556 Studies in Heterogeneous Catalysis. Part 1. The Hydrogenation of Methylacetylene. Part 2. The Hydrogenation of Allene. Part 3. The Hydrogenation of Mixtures of Hydrocarbons. G. C. Bond and J. Sheridan. *Transactions of the Faraday Society*, v. 48, July 1952, p. 651-668.

Numerous graphs and tables. 23 ref.

12557 The Addition of Thio-Compounds to Olefins. III. Reactions of Tri- and Hexa-Methylenedithiols, and of Bisthiol-Adipic and -Sebacic Acids. J. I. Cunneen. *Journal of Applied Chemistry*, v. 2, July 1952, p. 353-357.

Describes above reactions including some with natural rubber and gives physical characteristics of some vulcanizates. Tables. 12 ref.

12558 The Distribution of Alcohols in the Products of the Fischer-Tropsch Synthesis. D. Gall, E. J. Gibson, and C. C. Hall. *Journal of Applied Chemistry*, v. 2, July 1952, p. 371-380.

An alcohol-rich product obtained by above synthesis in the presence of a cobalt catalyst was examined. Proportions of compounds were markedly different than those reported to be present in an iron-catalyst product of the Hydrocol type. Also presents a study of n-primary alcohols related to stability and synthesis conditions. Graphs and tables. 21 ref.

12559* Sulfur Metabolism in *Escherichia Coli*. IV. Influence of Non-methionine Sulfur Compounds Upon a Methionine Requiring Mutant. Dean B. Cowie and Ellis T. Bolton. *Journal of Bacteriology*, v. 64, July 1952, p. 87-96.

12560 Nitration Studies. I. General Mechanism of Vapor Phase Nitration. G. Bryant Bachman, L. M. Addison, J. V. Hewett, L. Kohn, and A. Millikan. **II. Effect of Oxygen on the Vapor Phase Nitration of Butane.** G. Bryant Bachman, Henry B. Hass, and L. M. Addison. **III. Effect of Oxygen on the Vapor Phase Nitration of Propane With Nitrogen Dioxide.** G. Bryant Bachman, H. B. Hass, and J. V. Hewett. **IV. Effect of Bromine in the Vapor Phase Nitration of Propane.** G. Bryant Bachman, J. V. Hewett, and A. G. Millikan. **V. Effect of Chlorine in Vapor Phase Nitration With Nitric Acid.** G. Bryant Bachman and Leon Kohn. *Journal of Organic Chemistry*, v. 17, July 1952, p. 906-954.

Tables and graphs. 35 ref.

12561 The Free Radical Addition of Aldehydes to Unsaturated Poly-Carboxylic Esters. Tracy M. Patrick. *Journal of Organic Chemistry*, v. 17, July 1952, p. 1009-1016.

18 references.

12562 Development of the Method for Preparation of P-Benzoquinones From Aromatic Nitro Compounds Via Electrolytic Reduction to Aminophenols. Robert E. Harman and James Cason. *Journal of Organic Chemistry*, v. 17, July 1952, p. 1047-1057.

Includes critical discussion of some of the principles of electrolytic reduction. Tables, graph, and diagrams. 12 ref.

12563 Structure of Proteins. John T. Edsall. *Nature*, v. 170, July 12, 1952, p. 53-55.

Discusses recent developments in the study of proteins and synthetic polypeptides.

12564 Adsorption of Amino-acids on Sparingly Soluble Inorganic Solids. D. J. O'Connor and F. Bryant. *Nature*, v. 170, July 12, 1952, p. 84-85.

Brief discussion on the adsorption of aspartic acid and glycine.

12565* Geometrical Isomerism About Carbon-Carbon Double Bonds. L. Crombie. *Quarterly Reviews*, v. 6, 1952, p. 101-140.

228 references.

12566 The Dielectric Estimation of Protein Hydration. T. J. Buchanan, G. H. Haggis, J. B. Hasted, and B. G. Robinson. *Proceedings of the Royal Society*, ser. A, v. 213, July 8, 1952, p. 379-391.

Microwave dielectric measurements on 6 aqueous protein solutions are analyzed in terms of water irrotationally bound to the protein, i.e. unable to rotate in a high-frequency field. Estimates are made of the maximum amount of bound water, i.e. water carried through the solution with the protein, as a function of axial ratio, assuming a spheroidal molecule. 35 ref.

12567 The Chemical Approach to the Control of Tuberculosis. H. Herbert Fox. *Science*, v. 116, Aug. 8, 1952, p. 129-134.

Reviews what is known of the above. 56 ref.

12568 Specific Volumes of Proteins and the Relationship to Their Amino Acid Contents. T. L. McMeekin and Kathleen Marshall. *Science*, v. 116, Aug. 8, 1952, p. 142-143.

Briefly discusses the above. Includes table.

Miscellaneous Publications

12569 Solubility of Water in Hydrocarbons. R. R. Hibbard and R. L. Schalla. National Advisory Committee for Aeronautics,

27. *Chemistry—Organic*

Research Memorandum E52D24, July 10, 1952, 25 pages. (TL782 Un3rm)

Equation for estimating solubility of H_2O in any non-olefinic hydrocarbon or hydrocarbon blend at any temperature. Only the temperature and the H-C ratio of the hydrocarbon need be known. Tables and graphs. 23 ref.

Books

12570 Biochemical Preparations. Vol. 2. Eric G. Ball, editor-in-chief. 109 pages. 1952. John Wiley & Sons, Inc., New York. (QP509 B52p)

Preparations are given for the following: cytochrome *c;* cucurbit seed globulin; oxycasein; phosvitin, sodium salt; crystalline lactate dehydrogenase ;sodium pyruvate; phosphoryl-enolpyruvic acid; L-α-glycerophosphoric acid; glucose-6-phosphate; C^{14} uniformly labeled sucrose; fructose-1, 6-diphosphate; myo- and dl-epi-inosose-2; inositol monophosphate; dl-glutamic acid monohydrate; l-aspartic acid; S-benzyl-l-cysteinylycine; α-methyl carbobenzoxy-l-glutamate; N-carbobenzoxy-γ-l-glutamyl-S-benzyl-l-cysteinylglycine; glutathione; reduced diphoshopyridine nucleotide; phosphorylcholine; oleic acid and methyl oleate; and methyl ricinoleate.

12571 Chemistry of Carbon Compounds. Vol. 1, Part B. Aliphatic Compounds. E. H. Rodd, editor. 1462 pages. 1952. Elsevier Publishing Co., New York. (QD251 C42)

Completes systematic treatment of aliphatic compounds started in Vol. IA except for rubber and rubber-like high molecular substances. Carbohydrate compounds are given an unusually full treatment. Includes also chapters on proteins and enzymes. Numerous text references.

12572 Progress in the Chemistry of Organic Natural Products. (English or German.) Vol. 8. L. Zechmeister, editor. 400 pages. 1951. Springer-Verlag, Vienna, Austria. (QD245 F77c)

Articles as follows: "The Fine Structure of Cellulose", A. Frey-Wyssling and K. Mühlethaler (English); "Bacterial Dextrans", M. Stacey and C. R. Ricketts (English); "Sugar Phosphates", L. F. Leloir (English); "The Chemistry of Nucleotides", G. W. Kenner (English); "Violet Perfumes", H. Schinz (German); "Recent Developments in the Field of Lichens", Y. Asahina (German); "Lupine Alkaloids and Related Compounds", F. Galinovsky (German); "Ipecac Alkaloids", M. Pailer (German); "X-Ray Diffraction Studies of Crystalline Amino Acids and Peptides", R. B. Corey (English); and "Some Aspects of Enzyme Chromatography", L. Zechmeister (English.)

12573* Tables of Chemical Kinetics. Homogeneous Reactions. 1951. 731 pages. National Bureau of Standards, Washington. (Circular 510) (QA845 Un3t)

Purpose is a critically evaluated compilation of available factual numerical data on rates and rate constants of homogeneous chemical reactions. Stress is on experimentally ascertained facts; data largely contingent on interpretations have generally not been included. The reaction types covered are arranged systematically. Main headings are: Rearrangement and Isomerization, Condensation and Solvolysis, Exchange and Substitution, Elimination, Dissociation and Decomposition, Association and Addition, and Oxidation and Reduction. Literature references follow each table.

See also:
12497 (systems of CH_3COCH_3, $C_2H_5COCH_3$, and H_2O)
12529 (p-v-t relationships of organic compounds)
12792 (phosphorescence of proteins)

28. PLASTICS AND HIGH POLYMERS

12574 Repairing Reinforced Plastics. *Aero Digest,* v. 65, Aug. 1952, p. 20-23.

Describes and illustrates techniques developed by Naval Air Development Center, Johnsville, Pa. for repair of damaged radomes formerly scrapped.

12575* Glass-Reinforced Plastics. G. C. Hulbert. *Aircraft Production,* v. 14, June 1952, p. 282-287.

Properties of materials; resins; design considerations; typical applications; and methods of manufacture.

12576* Molecular Dimensions of Polydimethylsiloxanes. P. J. Flory, L. Mandelkern, J. B. Kinsinger, and W. B. Shultz. *Journal of the American Chemical Society,* v. 74, July 5, 1952, p. 3364-3367.

Intrinsic viscosities of carefully-fractionated polydimethylsiloxanes were determined in methyl ethyl ketone and in phenetole at the limiting critical miscibility temperatures 20 and 83°C. for the two solvents, respectively. Tables and graphs. 21 ref.

12577* Compositional Relationships in the Copolymerization of Ethylene With Carbon Monoxide. D. D. Coffman, P. S. Pinkney, F. T. Wall, W. H. Wood, and H. S. Young. *Journal of the American Chemical Society,* v. 74, July 5, 1952, p. 3391-3393.

Compositions of polyketones synthesized by the copolymerization of ethylene with CO were found to depend upon temperature, pressure, and composition of the reacting mixture. It was predicted theoretically and confirmed experimentally that a particular mixture of monomers will copolymerize to give a product of the same composition. Tables.

12578 Elastoviscous Properties of Polyisobutylene. VI. Relation Between Stress Relaxation Modulus and Dynamic Modulus. Arthur V. Tobolsky. *Journal of the American Chemical Society,* v. 74, Aug. 5, 1952, p. 3786-3788.

Concerns an idealized distribution function for the complete elastoviscous behavior of polyisobutylene, and derived expressions for above moduli. Tables and graphs. 12 ref.

12579* Plastics Body Construction. *Automobile Engineer,* v. 42, June 1952, p. 223-229; July 1952, p. 268-270.

A survey of recent developments and methods. Topics covered in the first part include: general properties of plastics; resins; reinforcing materials; and design. Second part deals with sandwich construction; molding of plastics other than those cured by water condensation; layout methods; and some practical applications. Tables, graphs, and photographs.

12580* A Castable Polyester Resin for Photoelastic Work. B. Sugarman, G. O. Moxley, and I. A. Marshall. *British Journal of Applied Physics,* v. 3, July 1952, p. 233-237.

Requirements for 3 dimensional model-making plastics are discussed in detail, and faults of the few materials used to date listed. Introduction of a crosslinked polyester resin, readily available, into this field permits further investigations to be conducted. The chemical and physical properties of this new resin are considered, and a theory explaining the "frozen" effect propounded.

12581 Plastics for Automobile Bodies. *British Plastics,* v. 25, July 1952, p. 218-221.

Describes and illustrates production techniques for the Glasspar car, made in Costa Mesa, Calif., from a polyester resin.

12582 Some Observations on the Darkening of Commercial Tricresyl Phosphate. E. H. Searle and L. G. Whitlock. *British Plastics,* v. 25, July 1952, p. 235-237.

A number of observations are recorded, and it is suggested that these support the view that primary aromatic amines derived from coal tar and the cause of the color instability. 0.02-0.10% o-toluidine added to an otherwise non-browning tricresyl phosphate is sufficient to induce the color variations normally observed in storage. The relation between various tests and color instability when the plasticizer is stored, when it is heated, and when it is exposed to light are discussed. 13 ref.

12583* Plastics Equipment Reference Sheet. Raymond B. Seymour and Earl A. Erich. *Chemical Engineering Progress* (Engineering Section), v. 31, July 1952, p. 374.

Data sheet on rigid polyvinyl chloride. Composition, machinability, forms available, temperature limitations, physical and mechanical properties, applications, and corrosion resistance to chemicals and industrial materials. (Extensive table of the latter.)

12584 Structure-Property Relationships in Polyethylene Terephthalate Co-Polyesters. Part I. Melting Points. O. B. Edgar and E. Ellery. **Part II. Second-Order Transition Temperatures.** O. B. Edgar. *Journal of the Chemical Society,* July 1952, p. 2633-2643.

Melting points of polyethylene terephthalate/adipate and poly-

ethylene terphthalate/sebacate copolymers were measured by a penetrometer method. Latent-heat-of-fusion calculations were made. In Part II, application of the penetrometer technique described in Part I was used for measurement of 2nd-order transition temperatures. On application of this method to copolyesters of polyethylene terephthalate containing as the modifying component varying proportions of the polymethylene-dicarboxylic acids, the 2nd-order transition temperature was found to be a linear function of the number of p-phenylene groups per 100 aliphatic chain atoms. Includes graphs, tables, and x-ray diffraction patterns.

12585 Synthetic Cement as Bonding Material. (German.) P. Voigt. *Chemische Technik*, v. 4, Apr. 1952, p. 177-181.

Discusses production, mechanical properties, and uses of a cement for metals which cannot conveniently be joined by welding, riveting, or other means. Photographs, tables, and diagrams.

12586 Plastics in Chemical Plant. G. H. Black. *Chemistry & Industry*, July 26, 1952, p. 727-734.

Reviews properties and applications of the various types. Includes table of chemical resistance of 8 common types to various chemicals and industrial liquids. Some equipment is described and diagrammed.

12587* Grilon As a Synthetic Plastic. (German.) R. Gabler. *Chimia*, v. 6, Apr. 1952, p. 77-83; July 1952, p. 165-169.

Discusses chemical structure, production, and properties of Grilon, a polyamide-type plastic material. Second part describes the fabrication of Grilon by injection molding and by pressure molding. Diagrams, graphs, tables, and photomicrographs.

12588* Wider Design Opportunities With the New Phenolics. Part III. The Laminates. (Concluded.) Alex E. Javitz. *Electrical Manufacturing*, v. 50, Aug. 1952, p. 92-96, 314, 316, 318.

Discussion of special types of glass-fiber-base laminates; other synthetic-fiber-base laminates using Nylon and Orlon; the epoxy-resin laminates; and foam-type phenolics. Numerous tables and illustrations.

12589 A Study of Plasticizer Migration in Vinyl Compounds. James R. Geenty, *India Rubber World*, v. 126, Aug. 1952, p. 646-649.

Describes migration test said to be simple to perform, accurate, practical, and to give reproducible results. Both film or sheeting and coating stripped from fabric can be tested by this method. Data are given on migration characteristics of various plasticizers. Effect of test temperature is discussed, as in effect of plasticizer migration on low-temperature flexibility.

12590* Synthetic Resins for Foundry Use. *Engineer*, v. 194, July 1952, p. 85-86.

The materials and techniques described are those now under investigation and development at Imperial Chemical Industries Ltd., Plastics Division, Welwyn, England.

12591 Teflon Tetrafluoroethylene Resin Dispersion. A New Aqueous Colloidal Dispersion of Polytetrafluoroethylene. John F. Lontz and William B. Happoldt, Jr. **Extrusion Properties of Lubricated Resin From Coagulated Dispersion.** John F. Lontz, Joseph A. Jaffe, Lester E. Robb, and William B. Happoldt, Jr. *Industrial and Engineering Chemistry*, v. 44, Aug. 1952, p. 1800-1810.

Properties of above polymer form are described with respect to particle size, shape, sedimentation, coagulation, and stability. Data on solids content vs. specific gravity and viscosity of stabilized dispersions are reported with a description of the film-forming properties. Preparation of films by a method involving casting, drying, and baking is described along with limitations imposed by "critical thickness".

12592* Study on the Solubility of Some High-Vinyl Polymers. (French.) Nguyen Quang Trinh and Simone Vuccino. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, May 1952, p. 331-336.

Reviews the above on the basis of the literature. Reports on solubility experiments on polyvinylacetal, acetylchloride, and polyvinylchloride. Results are discussed. Tables, charts, and 13 ref.

12593* Implications of Philippoff Flow Curves for the Determination of Intrinsic Viscosity of High Polymer Nitrocelluloses. Carl M. Conrad and Hilda M. Ziffle. *Journal of Colloid Science*, v. 7, June 1952, p. 227-235.

12594* The Flow of Polystyrene Through Rectangular Channels. C. E. Beyer and F. E. Towsley *Journal of Colloid Science*, v. 7, June 1952, p. 236-243.

Simplified method of determining the above for use in practical engineering calculations. 11 ref.

12595* Residual Stresses and Strains in Molded Plastics. W. H. Markwood, Jr. and H. M. Spurlin. *Journal of Colloid Science*, v. 7, June 1952, p. 244-252.

Discussion is primarily aimed at illustrations of the molding behavior of ethyl cellulose, for which little fundamental information has been reported. The purpose is to present some of the reasons why this polymer behaves as it does and why some difficulties have arisen when it has been injection molded. Experimental results are charted and discussed.

12596* Constant Stress Elongation of Soft Polymers; Time and Temperature Studies. C. A. Dahlquist and M. R. Hatfield. *Journal of Colloid Science*, v. 7, June 1952, p. 253-267.

Describes use of above method for study of time and temperature dependence of viscoelastic properties of polyisobutylene and GR-S. 11 ref.

12597* Application of Eyring's Rate Equation to Viscometric Data on Paraplex. H. B. Whitfield and Thomas Baron. *Journal of Colloid Science*, v. 7, June 1952, p. 268-271.

Theoretical analysis and experimental investigation.

12598* Effects of Hampered Draining of Solvent on the Translatory and Rotatory Motion of Statistically Coiled Long-Chain Molecules in Solution. Part II. Rotary Motion, Viscosity, and Flow Birefringence. Hans Kuhn and Werner Kuhn. *Journal of Polymer Science*, v. 9, July 1952, p. 1-33.

12599* Effect of Chemical Structure on Physical Properties of Isomeric Polyesters. E. F. Izard. *Journal of Polymer Science*, v. 9, July 1952, p. 35-39.

A study showing that changes in the chemical structure of aromatic polyesters have a pronounced effect on melting points and crystallinity of the polymers.

12600* The Elasticity of Polythene Melts. E. A. W. Hoff. *Journal of Polymer Science*, v. 9, July 1952, p. 41-52.

Above was measured with a resonance method by inducing shear oscillations in the region near 30 cycles per sec., at small shear amplitudes. The experiments were performed at 130-230°C. and a range of (osmotic) molecular weights of 12,000-64,000. Graphs.

12601* Polyalkylene Sulfides Containing Silicon. XI. C. S. Marvel and Harry N. Cripps. *Journal of Polymer Science*, v. 9. July 1952, p. 53-60.

The optimum pH of the emulsion of hexamethylenedithiol and diallyldimethylsilane was found to be between 3.0 and 4.0. A variety of polyalkylene sulfides containing silicon were prepared using bulk, solution, and emulsion polymerization techniques.

12602* Structure of Copolymers From Polymerization of Ethylene on Polyvinyl Acetate. J. R. Roland and L. M. Richards. *Journal of Polymer Science*, v. 9, July 1952, p. 61-68.

The formation of "grafted" vinyl copolymers by polymerizing one monomer in the presence of a preformed vinyl polymer was extended to a new monomer-polymer combination, and one point of attachment of the lateral (grafted) polymer chain was shown precisely. Tables. 11 ref.

12603* Molecular Distribution in Condensation Polymers. Walter H. Stockmayer. *Journal of Polymer Science*, v. 9, July 1952, p. 69-71.

The theory of molecular distribution in condensation polymers is extended to include systems of a rather general type. Equations for distribution and the weight-average molecular weight are given.

28. *Plastics and High Polymers*

12604* Sorption of Vapors by Polymers. Terrell L. Hill and John W. Rowen. *Journal of Polymer Scienve*, v. 9, July 1952, p. 93-95.

Brief outline of a theory for the above by linear polymers, crosslinked (as in vulcanized rubber) or not. Combines a localized Langmuir adsorption on specific sites of the polymer with "solution" sorption of additional vapor molecules, using the Flory-Huggins and Flory-Rehner theories. 14 ref.

12605* Description of an Instrument for Measuring the "Blocking" of Plastic Foils. (German.) Otto Umminger. *Kunststoffe*, v. 42, June 1952, p. 169-170.

Described and illustrated device is used to determine effect of pressure and temperature on tendency of plastic foils to adhere to each other.

12606* How Can One Determine the Migration Rate of Plasticizers? (German.) Lisa Rössig. *Kunststoffe*, v. 42, June 1952, p. P48-P49.

Describes two methods of determining the rate of diffusion of plasticizer from one to another polyvinylchloride plate. Photographs and graphs.

12607 Nylon—Its Properties and Applications. Robert Lurie. *Materials & Methods*, v. 36, July 1952, p. 79-83.

Considers use of nylon for mechanical parts, such as gears, bearings, cams, housing, and many other industrial applications, on the basis of its qualities of strength, abrasion and corrosion resistance, noise dampening porperties, and ability to be molded to close tolerances. Numerous tables and graphs.

12608 Better Cars—More Plastics. *Modern Plastics*, v. 29, Aug. 1952, p. 71-80, 162-166, 168-170, 172.

Illustrated survey of new and old applications, indicating trends.

12609 One-Piece Molded Styrene Battery Case Weighs 8½ Pounds. *Modern Plastics*, v. 29, Aug. 1952, p. 90-91.

Produced on a 200-oz. machine, in a mold weighing 7 tons, cases are annealed to relieve stresses.

12610 Extrusion of Nylon. *Modern Plastics*, v. 29, Aug. 1952, p. 99-102, 104-105, 108, 172.

Describes and diagrams equipment and procedures for producing forms. Data are tabulated.

12611* Investigation of Polymerization Kinetics With α-Azoisobutyric Acid Nitrile and Benzoyl Peroxide in Styrene for Clarification of Initiation and Chain Reactions. (German.) J. W. Breitenbach and A. Schindler. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 3, 1952, p. 724-730.

12612 Laminated Thermosetting Plastics. F. C. McCamly. *Petroleum Engineer*, v. 24, Aug. 1952, p. C43-C44, C46.

High mechanical strength, corrosion resistance, and low moisture absorption are outstanding features of above produced by Synthane Corp., Oaks, Pa.

12613 Vinyl Plasticizer Developments. Richard G. Kadesch. *Modern Plastics*, v. 29, Aug. 1952, p. 111-112, 114, 118, 178, 180-182.

Comprehensively reviews the above. 107 literature and patent references.

12614* The K-Values of Polyvinyl Chlorides. (Dutch.) P. Platzek. *Plastica*, v. 5, Jan. 1952, p. 19-24.

In production control, K-value is widely used as an indication of average molecular weight of soluble macromolecules. This empirical value is derived from viscosity measurements. Shows how K-value can be evaluated from experimental data. Figures for different grades of polyvinylchloride are given. Tables and graphs.

12615* Glass Fibre Reinforced Plastics. *Plastics*, July 1952, p. 198, 215.

Presents summaries of part of the papers read before the Glass Fibre Reinforced Plastics Convention held in Britain in May.

12616* Preheating Moulding Materials With Particular Reference to Live Steam Preheating. H. H. Ball. *Plastics Institute Transactions*, v. 20, Jan. 1952, p. 7-36; disc., p. 36-38.

Methods of preheating by convection, infrared radiation and radio (high)frequency are first described, their relative merits and the advantages of preheating discussed. The main part of the discussion deals with live steam preheating. Tests on material preheated with live steam and otherwise, and of moldings made from it, are described and results given.

12617* Some Plastics and Their Uses in Surgery. John T. Scales. *Plastics Institute, Transactions*, v. 20, Jan. 1952, p. 74-87; disc. p. 87-90.

Discusses properties required for the internal and external application of plastics to the human body. Describes methods of testing the reaction of tissues to plastics. Gives examples of the use of polymethyl methacrylate and polyethylene and the methods of manipulating them. Photographs. 24 ref.

12618* Extrusion Problems. K. Leyland. *Plastics Institute, Transactions*, v. 20, Jan. 1952, p. 91-105; disc., p. 106-110.

Discusses the causes of and remedies for faults which occur in the extrusion of polyvinylchloride cable coverings. Main features of extruders are explained briefly. Possible faults are analyzed, their caused indicated, and remedies suggested.

12619* The Polymerisation of Aldehydes. J. C. Bevington. *Quarterly Reviews*, v. 6, 1952, p. 141-156.

Concerned primarily with formation and properties of cyclic and linear polymers of aldehydes. 37 ref.

12620* Apparent Osmotic Pressure of Solutions of Heterodisperse Polymers. (English.) A. J. Staverman. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, June 1952, p. 623-633.

The theory of apparent osmotic pressure obtained with membranes which are partially permeable to the solute is applied to solutions of heterodisperse polymers. An expression for the relation between measured osmotic pressure and permeability of the membrane is derived and it is shown how molecular distributions of polymers can be obtained from simultaneous measurements of permeability and osmotic pressure with a given polymer-solvent-system and different membranes.

12621* Some Properties of Thermoplastic Fiber-Bonded Fabrics. Arthur C. Wrotnowski. *Textile Research Journal*, v. 22, July 1952, p. 480-486.

Test procedures and physical properties are given for cotton, nylon, garnett, asbestos, and glass thermoplastic fiber-bonded fabrics. A range of thicknesses for each blend and weight is used to demonstrate a wide variety of fibrous constructions. Tensile strength, air permeability, and water-absorption characteristics of 4 fiber-bonded fabrics are discussed.

Miscellaneous Publications

12622 Methods and Equipment for Testing Printed-Enamel Felt-Base Floor Covering. George G. Richey, Elizabeth H. McKenna, and Robert B. Hobbs. National Bureau of Standards, Building Materials and Structures Report 130, May 1, 1952, 10 pages. (TA401 Un3b)

Describes above for measuring weight, over-all thickness, thickness of enamel and of seal coat, resistance to scrubbing with cleaning compound, resistance to kerosene, flexibility, and tearing strength. Laboratory tests correlated with service tests of 11 proprietary products. Tables, photographs, and diagrams.

12623 Plastics for Photoelastic Analysis. J. P. Vidosic. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 113-124. (TG265 So13p).

Describes investigation of some of the newer transparent or translucent plastics for the above, instead of the usual Bakelite. Includes tables, graphs, diagrams, and photographs of stress patterns in photoelastic test samples.

12624* Reports on Plastics in the Tropics. 1. Expanded Plastics. His Majesty's Stationery Office, 1951, 17 pages. (TP986 G79r)

Expanded ebonite and several types of expanded plastics were exposed to carefully selected combinations of tropical conditions for a period of 6 mos. Deterioration in physical state was noted throughout the exposure period; and factors causing that deterioration were examined.

See also:
12107 (viscosity of polymeric liquids)
12379 (plastic vacuum-cleaner parts)
12404 (manufacture of low density plastics)
12412 (antifungus treatments for plastics)
12453 (sugar cane bagasse in plastics)
12662 (coatings for plastics)
12918 (polymeric impregnants for paper capacitors)

29. RUBBERS AND OTHER ELASTOMERS

12625* Elastoviscous Properties of Amorphous Polymers in the Transition Region. I. J. Bischoff, E. Catsiff, and A. V. Tobolsky. *Journal of the American Chemical Society*, v. 74, July 5, 1952, p. 3378-3381.

Experimental data on the stress-relaxation modulus of a GR-S gum vulcanizate at a series of temperatures in the transition region are presented. A master curve is constructed, an analytical formulation of $Q(t/K)$ is given, and K values at different temperatures are tabulated. Graphs.

12626* A Study of Rubber Adhesives in Shoes as the Cause of Dermatitis of the Feet. Irvin H. Blank and Owen G. Miller. *Journal of the American Medical Association*, v. 149, Aug. 9, 1952, p. 1371-1374.

24 cases of dermatitis of the feet that seem to be caused by shoes were studied. Table gives patch-test reactions to 28 accelerators and antioxidants in 5 groups.

12627 $6.5 Million Rubber Research and Development Program. *Chemical and Engineering News*, v. 30, Aug. 4, 1952, p. 3170-3171.

Reviews the above.

12628* Hydrocarbon Composition of Rubber Processing Oils. S. S. Kurtz, Jr. and C. C. Martin. *India Rubber World*, v. 126, July 1952, p. 495-499.

Oil-extended rubber is now being made in which 25 parts or more of oil are added based on 100 parts of butadiene-styrene copolymer. Describes the types of hydrocarbon molecules present in rubber-processing oils from petroleum and gives a brief outline of methods which can be used for getting such information. 25 ref.

12629* Paley Commission Report on Rubber. *India Rubber World*, v. 126, July 1952, p. 501-504. (Based on Chap. 20, "Rubber—Natural and Synthetic," President's Materials Policy Commission Report of June 23, 1952.)

12630 Fractionation of Fresh and Preserved Hevea Latex by Centrifuging. G. Verhaar. *India Rubber World*, v. 126, Aug. 1952, p. 636-640, 644.

Influence of addition of distilled water, sodium sulfate, ammonia, and formaldehyde on the fractionation of undiluted fresh Hevea latex by centrifuging was determined. 12 ref.

12631 The Bulk Polymerization of Styrene. M. F. Vaughan. *Journal of Applied Chemistry*, v. 2, July 1952, p. 422-428.

Kinetics of above (late stages) in range 0-100% conversion. Observations on "gel" effects. Parallel polymerizations in presence of N_2 and of air. Tables and graphs. 20 ref.

12632* A Generalized Fluidity Power Law and Laws of Extrusion. M. Mooney and S. A. Black. *Journal of Colloid Science*, v. 7, June 1952, p. 204-217.

The rheological theory is extended to include a 3-dimensional generalization of the fluidity power law. In the experimental section, rates are reported for a range of pressures and a series of circular tubes of various radii and lengths.

12633 Effect of Temperature and Composition Upon the Resilience of Elastomers. E. F. Schulz. *Modern Plastics*, v. 29, Aug. 1952, p. 120, 122, 124, 185.

Resilience of elastomers at temperatures from 0 to 170° C. was successfully measured with the Bashore Resiliometer. Such test results are insensitive to sample geometry or finish, are independent of operator effects, and are of good reproducibility. Results are charted, tabulated, and discussed.

12634 Experiments on the Mechanics of Rubber. II. The Torsion, Inflation and Extension of a Tube. A. N. Gent and R. S. Rivlin. *Proceedings of the Physical Society*, v. 65, sec. B, July 1, 1952, p. 487-501.

Resulting formulas are compared with measurements on tubes of vulcanized natural rubber and conclusions as to the form of the stored-energy function are drawn. Tables and graphs.

12635* Activities of the French Rubber Institute. (French.) R. Hublin. *Revue générale du Caoutchouc*, v. 29, July 1952, p. 474-477.

Describes and illustrates facilities of above organization. Outlines work on 8 problems (3 on tires, 5 on reinforced latexes).

12636* Chemical Studies of Rubber Plasticization Accelerators. (French.) Michel Montu. *Revue générale du Caoutchouc*, v. 29, July 1952, p. 506-510.

Presents details of experimental study of the above. During mastication in the presence of various peptizing agents, it was found that the most active ones belong to the aromatic mercaptan group. Oxidation of rubber in the presence of various accelerators was studied. The mercaptan-disulfide transformation was studied using ultraviolet spectrography. Graphs. 10 ref.

12637* Some Problems Arising During Preparation of Rubber Stocks. (French.) Eugene Stalinsky. *Revue générale du Caoutchouc*, v. 29, July 1952, p. 510-514.

Discusses method of incorporation of fillers. Recommends use of a homogenizer preliminary to incorporation, also heating to about 150°C. Air in the filler was found to slow the incorporation process. Degassing improved this in some cases. Tables.

12638* Dielectric Study of Polar and Nonpolar Rubbers Loaded With Carbon Black. I. Experimental Part. (French.) Renée Dalbert. *Revue générale du Caoutchouc*, v. 29, July 1952, p. 515-518.

A polar and a nonpolar rubber were studied, using 3 carbon blacks in 3 concentrations. 10 ref.

12639 Ultra-Fine Precipitated Calcium Carbonate as a "White Carbon Black" Victor H. Vodra. *Rubber Age*, v. 71, July 1952, p. 507-514.

Discussion of the above includes a definition of rubber reinforcement; carbon black vs. calcium carbonates; effect of particle size on quality and other pertinent information. Numerous graphs and tables with 2 pages of photomicrographs of black and non-black fillers.

12640* Abrasion Resistance of GR-S Vulcanizates. J. W. Adams, J. A. Reynolds, W. E. Messer, and L. H. Howland. *Rubber Chemistry and Technology*, v. 25, Apr.-June 1952, p. 191-208.

Describes development of abrasion resistance of reinforced vulcanizates for evaluating new GR-S type elastomers and carbon blacks developed for use in automobile-tire treads. Several machines were evaluated. A Lambourn abrader similar to the one recently adopted by the British Standards Institution for testing elastomer vulcanizates appeared to be most promising. Data obtained showed that it was better than most laboratory devices for determining the effect of carbon blacks, elastomers, and other compounding variables on abrasion-resistance as compared to tire wear resistance. 11 ref.

12641* Studies of the Vulcanization of Rubber. Shu Kambara and Kumakazu Ohkita. *Rubber Chemistry and Technology*, v. 25, Apr.-June 1952, p. 209-229.

Review of published research by the senior author and his associates at Rubber Research Laboratory, Tokyo Institute of Technology. 38 ref.

12642* Diffusion of Oxygen and Oxidation of Rubbers in the Presence of Phenyl-β-Napthaylamine. A. S. Kuzminskii, L. L. Shanin, and N. N. Lezhnev. *Rubber Chemistry and Technology*, v. 25, Apr.-June 1952, p. 230-233. (Translated from *Doklady Akademii Nauk SSSR*, v. 79, no. 3, 1951, p. 467-470.)

Previously abstracted from the original.

12643* Studies of the Mechanism of Mastication of Rubber. III. The Mutual Effects of Organic Bases and Softeners on the Viscosity Lowering of Rubber Solutions. Minoru Imoto. *Rubber Chemistry and Technology*, v. 25, Apr.-June

29. *Rubbers and Other Elastomers*

1952, p. 234-240. (Reprinted from *Journal of the Institute of Polytechnics,* (Osaka City University, Japan) v. 1, Oct. 1950, p. 73-79.)

12644* An Infrared Spectrometric Study of the Oxidation of Natural Rubber. L. D'Or and I. Kossler. *Rubber Chemistry and Technology,* v. 25, Apr.-June 1952, p. 251-257. (Translated from *Industrie Chimique Belge,* v. 16, no. 3, 1951, p. 133-137.)

Describes procedure. Presents and discusses experimental results.

12645* X-Ray Analysis of the Molecular Structure of Rubbers. X-Ray Diffraction of Amorphous Rubber. V. I. Kasatochkin and B. V. Lukin. *Rubber Chemistry and Technology,* v. 25, Apr.-June 1952, p. 258-264. (Translated from *Izvestiia Akademii Nauk SSSR,* Physical Series, v. 15, no. 2, 1951, p. 209-217.)

Discusses change of molecular structure of rubber as a result of fatigue. Describes investigation of crystallization of loaded vulcanized rubbers and of the molecular orientation of loaded vulcanizates of synthetic rubber. Graphs.

12646* The Action of Unsaturated Compounds on Natural Rubber in Solution II. The Reaction Induced by Heat Alone. Andre Delalande. *Rubber Chemistry and Technology,* v. 25, Apr.-June 1952, p. 275-286. (Translated from *Bulletin de la Société Chimique de France,* Sept.-Oct. 1951, p. 773-778.)

The addition reaction at 170°C. of maleic N-methylimide with natural rubber in solution was studied. Attempts were made to apply the principles of kinetics to this reaction, but its complexity prevented success. Comparison of the fixation of acrylonitrile and that of maleic N-methylimide in the range 160-200°C. showed that rates of these reactions are in the ratio of 1 to 25-30. A mechanism of the reaction is proposed, in which free radicals play a part. 10 ref.

12647* The Heat Sensitivity of Hevea Latex. I. The Action of Zinc-Ammonium Complexes II. The Process of Heat Sensitization of Degraded Latex. Paul Cassagne. *Rubber Chemistry and Technology,* v. 25, Apr.-June 1952, p. 303-314. (Translated from *Revue générale du Caoutchouc,* v. 28, Jan. 1951, p. 39-42; Feb. 1951, p. 105-107.)

Previously abstracted from original.

12648* Estimation of the Technological Properties of Rubber Mixtures by Their Fluidity. F. I. Galperina. *Rubber Chemistry and Technology,* v. 25, Apr.-June 1952, p. 339-341. (Translated from *Legkaya Promyshlennost,* May 1951, p. 44-45.)

Describes and diagrams apparatus for determining the behavior of mixtures at vulcanization temperatures essential in the production of shoes. Typical results tabulated and discussed.

12649* Influence of the Test Sample on Results Obtained With Vulcanized Soft Rubbers. (German.) R. Herzog and R. H. Burton. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, June 1952, p. 177-189.

Compares tensile-test results on 8 different dumbell samples of 4 different rubbers. Proposes standardization of samples in order to achieve more generally valid test results. Data are tabulated and charted. Macrographs.

See also:
12079 (free S detn. in vulcanizates)
12404 (manufacture of low density rubber)
12557 (reactions and vulcanizates of rubber and thio-compounds)
12596 (elongation of synthetic rubbers)
12672 (Neoprene coatings)

30. PAINTS, VARNISHES, LACQUERS, AND ENAMELS

12650 Characteristics of Aluminum Soap Gels. Martin L. Stumpf. *American Paint Journal,* v. 36, July 28, 1952, p. 69-70, 72-73.

Appraises adaptability of certain soaps with a number of solvents giving detailed data especially for Al octoate gels.

12651 Enamel That Bakes Itself. *Business Week,* July 26, 1952, p. 62, 64.

Describes an epon-resin paint designed to resist corrosion. It can be applied in one operation and will harden without baking.

12652 New Developments in Paint Mildew Diagnosis. M. Goll and H. A. Birnbaum. *Canadian Chemical Processing,* v. 36, July 1952, p. 92, 94-95.

12653* A Method for Determining the Relative Fire-Retardant Values of Surface Coatings. R. C. Hubbard. *Chemistry in Canada,* v. 4, Feb. 1952, p. 29-32.

Reviews tests now used for fire-retardant evaluation by other laboratories. Newly developed method offers a new approach to the problem.

12654 Trifluorochloroethylene Polymer Resin Dispersion Films on Metal. F. E. Gusmer. *Corrosion* (News Section), v. 8, Aug. 1952, p. 1-2.

Describes method of surface preparation; application, and testing of above protective coating. Resistance to a variety of common chemicals and to heat was very good.

12655* Selecting Special-Property Organic Finishes. Allen L. Alexander. *Electrical Manufacturing,* v. 50, Aug. 1952, p. 106-109, 296, 298, 300, 302.

Describes specialty coatings based on the newer resins, such as silicones, epoxides, and fluorocarbons. Properties such as high-temperature stability and corrosion resistance are discussed. Illustrated.

12656 Surface-Treated Calcium Carbonates in a High-Solid Paint System. C. A. Kumins. *Industrial Engineering Chemistry,* v. 44, Aug. 1952, p. 1844-1849.

Investigation was begun to study the effect of hydrophobic-surfaced calcium carbonates in a high-solid paint system, with particular reference to their dispersion and rheological behavior. Graphs. 10 ref.

12657 Wash Primer Helps Industry Fight Corrosion. R. A. Garling. *Iron Age,* v. 170, July 24, 1952, p. 102-107.

Describes a vinyl-resin prime coat developed during World War II for marine uses which has since been adapted to other surfaces. The complex reaction responsible for its bonding properties is discussed in some detail. Illustrated.

12658* A High Shear Method of Rating Brushability of Paints. W. K. Asbeck, D. D. Laiderman, and M. Van Loo. *Journal of Colloid Science,* v. 7, June 1952, p. 306-315.

A rotational viscometer is described which operates in the range of high shear velocities encountered in the brushing of paints. Because the centering of the inner cylinder is handled automatically, the construction is rather simple, and clearances of 100 μ are maintained easily. At these clearances, shear velocities in the order of 20,000 reciprocal sec. are attainable, while at smaller clearances these values may be increased substantially without excessive temperature rise. Good correlation of brushability of paints was found between qualified painter opinion and ratings based on viscosity characteristics determined at the high shear velocities of about 12,000-35,000 reciprocal sec. established during brushing application.

12659 Protecting Metal Surfaces With Paint. Allen G. Gray. *Metal Progress,* v. 62, Aug. 1952, p. 79-81, 142, 144, 146.

Discusses grit and shot-blasting, wire brushing, flame conditioning, chemical methods, theory of paint protection, effect of electropotential gradients, and selection of pigments.

12660* Can Linings. S. L. Flugge and J. C. Brichta, Jr. *Modern Packaging,* v. 25, Aug. 1952, p. 131-134, 188.

Review of recent developments in protective internal coatings for steel and tinplate.

12661 Vinyl Dispersion—Organosols. Part II. E. M. Hayden. *Organic Finishing,* v. 13, July 1952, p. 13-16.

Surveys applications of fabric coating, paper coating, Al foil, inks, etc. Discusses processes for casting on a carrier, embossing, dipping, and spraying.

12662 Coatings for Plastic Products. M. A. Self. *Organic Finishing,* v. 13, July 1952, p. 19-23.

Reviews procedures and applications. Illustrated.

12663* Battelle Memorial Institute. E. E. McSweeny. *Paint Industry Magazine,* v. 67, July 1952, p. 21.

Describes facilities for research and development in the field of protective organic coatings.

12664 Examination of Varnish-Making Vegetable Oils. 2. (Concluded.) H. W. Chatfield. *Paint Manufacture,* v. 22, July 1952, p. 247-249, 255.

Surveys further tests to assess the qualities of above, examining such factors as odor problems, breaking tendencies, and crawling defects. Tables.

12665 The Processing and Utilisation of Castor Oil. C. Griffiths. *Paint Manufacture,* v. 22, July 1952, p. 250-253.

Reviews processes employed in the preparation of castor oil and its derivatives, together with their applications in the paint industry.

12666 The Mechanism of Drying Retardation of Toluidine Red Toners. A. Underhaug. *Paint Manufacture,* v. 22, July 1952, p. 254-255.

12667 Ford Viscosity Cup Tests: A Proposed Method for the Assessment of Paint, Varnish and Lacquer Viscosities. *Paint Manufacture,* v. 22, July 1952, p. 256-257.

Describes above method expected to become an ASTM standard. Diagram and graph.

12668 How Often Should a House Be Painted? Part I. An Experimental Study of Paint Maintenance. *Paint, Oil & Chemical Review,* v. 115, July 31, 1952, p. 16-18, 32-35; Aug. 14, 1952, p. 26, 42, 44-47.

Gives details of research on above by Forest Products Research Laboratory. Results (illustrated) indicate that it is possible to repaint too often as well as not often enough. Definite recommendations for frequency of painting are given. 12 ref.

12269 Improving Tall Oil Esters. Ernest C. Ford, Jr. and Morris D. Brewster. *Paint, Oil & Chemical Review,* v. 115, Aug. 14, 1952, p. 14, 48, 52.

Research followed by commercial application on a wide scale shows that especially desirable properties are imparted to tall-oil esters made with sorbitol. Synthetic drying oils made from sorbitol and drying-oil fatty acids are superior to corresponding natural oils in drying rate, toughness, durability and adhesion. Data on various formulations including sorbitol are tabulated and discussed.

12670* Protective Coating Research by the Corps of Engineers. *Paint and Varnish Production,* v. 42, Aug. 1952, p. 17-22, 45-47.

Describes and illustrates facilities and research programs of Engineer Research and Development Laboratories, Fort Belvoir, Va.

12671* An Indentation Meter for Paint. J. Hoekstra and J. A. W. van Laar. *Philips Technical Review,* v. 13, June 1952, p. 352-359.

Describes a sapphire indenter which is specially shaped to give a reproducible impression when applied to a coat of paint. The depth of this impression is measured by an electrical zero method. Tables, diagrams, and graphs.

12672 Neoprene Protective Coatings. L. S. Blake. *Product Engineering,* v. 23, Aug. 1952, p. 138-139.

Neoprene rubber is now available in room temperature curing solutions with high solids content. Surveys applications in coatings. Illustrated.

12673 Some Newer Organic Protective Coatings. David Busker. *Product Engineering,* v. 23, Aug. 1952, p. 167-174.

Illustrated article covers recent developments; outstanding properties of the resin-base finishes; industrial applications; specialty finishes; and strippable films.

12674* Military Uses of Organic Finishes. *Products Finishing,* v. 16, Aug. 1952, p. 46, 48, 52, 56, 58, 60, 62, 66, 68.

Report on 4 talks given before the Lacquer Panel, 63rd Annual Convention, National Paint, Varnish, and Lacquer Association. Includes requirements of Ordnance and Air Force, tests for military finishes, and a table on properties of aircraft finishes. Photographs.

12675* Experimental Apparatus for Determination of Adhesion of Varnish to the Base. Variation of Adhesion in Relation to Condition of the Metal Surface. Experimental Results. (French.) Otto Cuzzer, Carlo Pizzuto, and Licio Caccavo. *Revue de Métallurgie,* v. 49, June 1952, p. 423-435.

Describes, diagrams, and illustrates above apparatus. Typical results are analyzed and interpreted. Data are charted for adhesion of various coatings to different ferrous and nonferrous metals and alloys. Includes micrographs.

See also:
11963 (coatings for water-system corrosion prevention)
12412 (antifungus treatments for coatings)
12444 (linseed oil polymerization)
12451 (technology of oil paints)

31. AGRICULTURAL RESEARCH

12676* A New Silica for Formulating 75% DDT Wetable Powders. Wm. E. Bissinger, C. L. Cormany, and W. R. Dial. *Agricultural Chemicals,* v. 7, Aug. 1952, p. 31-33, 117-119.

Compares results with a common clay, with hydrated calcium trisilicate ("Silene EF"), and with hydrated silica ("Hi-Sil"), both in a very finely divided state. Data tabulated.

12677* Engineering Developments and Challenges in Chemical Weed Control. Earl D. Anderson. *Agricultural Engineering,* v. 33, Aug. 1952, p. 482-484, 486.

Surveys new developments in spraying and dusting equipment.

12678* The Hydrolysis and Amino Acid Assay of Alfalfa, and the Methionine Range in 100 Selections. V. L. Singleton, E. T. Mertz, and R. L. Davis. *Agronomy Journal,* v. 44, July 1952, p. 346-348.

Methionine contents of 100 selections of alfalfas of different genetic backgrounds were determined microbiologically. The variation was small, ranging from 72 to 96 mg. per gram of nitrogen. 11 ref.

12679* Effects of Level of a Fertilizer Element on the Uptake and Concentration of that Element and Other Elements in a Plant. George Samuels and Bernardo G. Capo. *Agronomy Journal,* v. 44, July 1952, p. 352-357.

The plant materials used were Hegari sorghum (flowering stage) grown in the greenhouse, sugar-cane leaves at a crop age of 3 mos. grown in field experiments, and coffee leaves (fully developed new leaf) from field experiments. The crops received various fertilizer treatments where one fertilizer element was varied in the presence of fixed concentrations of the other elements. The experiments covered over 12 soil types which received different levels of N, P, K, and Cu.

12680* Increase in Herbicidal Activity of Sodium Trichloracetate When Combined With Some Contact Herbicides. T. J. Muzik and H. J. Cruzado. *Agronomy Journal,* v. 44, July 1952, p. 383-384.

Studies showed that addition of a number of chemicals, which alone act as contact herbicides, significantly increase the herbicides, significantly increase the herbicidal activity of TCA against many grasses, especially Bermuda and Para grass.

12681* Studies on Synthetic Growth Substances. I. (English.) Arne Fredga. *Arkiv för Kemi,* v. 3, nos. 2-3, 1951, p. 123-127.

A number of naphthalene derivatives containing an S atom and a COOH group in the side chain were prepared. Compounds of this type may form suitable material for studying the influence of structural and steric factors on biological activity of naphthalene derivatives.

12682* On the Action of Plant Growth Regulators. (English) R. C. Brian and E. K. Rideal. *Biochimica et Biophysica Acta,* v. 9, July 1952, p. 1-18.

The plant-growth regulator 2-methyl,4-chlorophenoxy acetic acid was reacted with a range of surface-active compounds, spread as monolayers on a Langmuir trough, to investigate factors involved in its mode of action within the plant. Estimations of adsorption on monolayers of a protein, lipoid, lipoprotein on to monlayers produced directly from plant tissue, lend support to the suggestion that the foundation of species susceptibility may be based upon the extent of its adsorption onto sites not concerned with physiological response. 23 ref.

31. *Agricultural Research*

12683* Free and Acid-Hydrolyzable Amino Acids in Four Range Grasses. Glenn S. Rabideau. *Botanical Gazette*, v. 113, June 1952, p. 475-479.

Above were studied by a paper-chromatography method. Tables.

12684* Influence of Temperature on Formative Response of Bean Seedlings to 2,4-Dichlorophenoxyacetic Acid. James W. Brown and Robert L. Weintraub. *Botanical Gazette*, v. 113, June 1952, p. 479-482.

12685* Lack of Effect of Plant Growth-Regulators on the Action of Alpha-Amylase Secreted by Virus Tumor Tissue. M. K. Brakke and L. G. Nickell. *Botanical Gazette*, v. 113, June 1952, p. 482-484.

12 references.

12686* Chemical Regulation of Sexual Processes in the Thallophytes. John R. Raper. *Botanical Review*, v. 18, July 1952, p. 447-545.

Comprehensive review. Diagrams and tables. 183 ref.

12687* Detection and Determination of 2,4-D As a Contaminant by Biological Methods. P. W. Zimmerman, A. E. Hitchcock, and Henry Kirkpatrick, Jr. *Contributions from Boyce Thompson Institute*, v. 16, Apr.-June 1952, p. 439-449.

Methods involving use of tomato and cotton plants are described for detection and determination of 2,4-D in unknown solutions, mixtures of 2,4-D and other growth regulants, and commercial formulations. Materials were applied to test plants as aqueous solutions, as vapors, and in lanolin. The principal responses induced were modification of leaves, curvature of leaves and stems, proliferation and killing of tissue. Illustrated.

12688* The Insecticidal Activity of the Eta Isomer of 1,2,3,4,5,6-Hexachlorocyclohexane. R. C. Back. *Contributions from Boyce Thompson Institute*, v. 16, Apr.-June 1952, p. 451-454.

Results of tests against 4 species of insects with the above isomer, with other isomers, and with representative insecticides, are presented.

12689 Agricultural Chemicals. *Chemical and Engineering News*, v. 30, July 28, 1952, p. 3078-3084.

Discusses important agricultural chemical products developed since World War II. Considers the following: insecticides, herbicides, pesticides, miticides, rodenticides, systemics, growth regulators, fumigants, soil conditioners and the use of antibiotics in plant-disease control.

12690 Analysis by Paralysis. *Chemical Week*, v. 71, July 26, 1952, p. 31, 33.

Describes a new anaytical method for insecticide residues now being perfected at Boyce Thompson Institute, Yonkers, N. Y. Method is a bio-assay with mosquito larvae serving as reagent organisms. Major advantages: speed, simplicity, and generally greater sensitivity than comparable chemical tests. It is said to be applicable to most commercial insecticides.

12691* Vitamin B_{12} and Antibiotics in Poultry and Animal Feeds. G. P. Whitlock. *Chemistry in Canada*, v. 4, Feb. 1952, p. 33-37.

A review. 60 ref.

12692* The Improvement of Soil Structure by Synthetic Polyelectrolytes. R. M. Hedrick and D. T. Mowry. *Chemistry & Industry*, July 5, 1952, p. 652-656.

Gives details of experiments on the above. Results are charted, tabulated, and illustrated. (Authors are from Monsanto, Dayton.) 17 ref.

12693 Induced and Other Variations in Bacterial Cultures. Part V. The Effect of Ultra-Violet Irradiation on *Bact. coli* With Special Reference to Nutritional Mutants. Part VI. A Comparison of the Efficiency of the Methods for Isolating Nutritional Mutants. A. C. R. Dean. **Part VII. The Stability of the Nutritional Requirements of the Srains Isolated After Irradiation of *Bact. coli*.** A. C. R. Dean and Cyril Hinshelwood. *Journal of the Chemical Society*, July 1952, p. 2817-2831.

12694 Menace of Oak Wilt. K. Starr Chester. *Chemurgic Digest*, v. 11, Aug. 1952, p. 4-5.

Discusses above fungus disease, its importance to industry, and possibilities of control. Map and photographs.

12695* Soil Conditions and Root Diseases. III. With Special Reference to Colonisation and Survival of Soil Fusaria in Soils Treated With Micro-Elements. C. B. Sulochana. *Proceedings of the Indian Academy of Sciences*, v. 35, sec. B, May 1952, p. 209-213.

Investigation deals mainly with the saprophytic activity of soil Fusaria in the presence of traces of Al, B, Co, Li, Mn, Mo, Ni, and Zn. Data are charted and discussed.

12696* Toxicology of Organic Phosphorus—Containing Insecticides to Mammals. Kenneth P. DuBois and Julius M. Coon. *A.M.A. Archives of Industrial Hygiene and Occupational Medicine*, v. 6, July 1952, p. 9-13.

The organic phosphorus-containing insecticides are classified into 3 groups; the alkyl pyrophosphates, the alkyl thiophosphates, and the phosphoramides. All of the members of these groups which are in wide current use as insecticides are highly toxic to insects and mammals. In the development of compounds with high insecticidal activity and low mammalian toxicity, the most promosing results thus far have been obtained in the thiophosphate series.

12697 Enzymes From Micro-Fungi. J. Dingle and G. L. Solomons. *Journal of Applied Chemistry*, v. 2, July 1952, p. 395-399.

113 cultures were examined in order to find fungi that could produce enzymes for industrial use. Table. 15 ref.

12698* Growth Factor Requirements of Halophilic Bacteria. H. Katznelson and A. G. Lochhead. *Journal of Bacteriology*, v. 64, July 1952, p. 97-103.

Above requirements of organisms ranging in optimal NaCl requirements from 4 to 25%, including nonchromogenic and chromogenic forms, were studied. 10 ref.

12699* Apparatus for Large Scale Anerobic Cultures in an Atmosphere of Helium. Alvin E. Bridges, Rollin E. Pepper, and V. L. Chandler. *Journal of Bacteriology*, v. 64, July 1952, p. 137-138.

12700* The Speed of Toxic Action on the Pea Aphid of Several Insecticides. Shen Chin Chang. *Journal of Economic Entomology*, v. 45, June 1952, p. 370-372.

Results of 19 laboratory tests. TEPP killed aphids much faster than parathion and EPN. Toxaphene, chlordan, dieldrin and aldrin gave very poor results.

12701* Field Tests of Insecticides for Control of Oriental Fruit Fly. Loren F. Steiner and Frank G. Hinman. *Journal of Economic Entomology*, v. 45, June 1952, p. 388-395.

Test results are extensively tabulated and discussed.

12702* Factors Determining the Effects of Radio-Frequency Electromagnetic Fields on Insects and Materials They Infest. Hubert Frings. *Journal of Economic Entomology*, v. 45, June 1952, p. 396-408.

Discusses work of other investigators. Describes techniques and results of experiments on 14 species of insects. Graphs. 35 ref.

12703* Effect of Environmental Factors on the Toxicity of Certain Insecticides. J. C. Gaines and W. J. Mistric, Jr. *Journal of Economic Entomology*, v. 45, June 1952, p. 409-416.

Tests reported were conducted to obtain additional information regarding effect of sunshine, dew, and rain on the toxicity of certain insecticides. 6 new compounds were tested as well as toxaphene, dieldrin, aldrin, parathion, and a gamma benzene hexachloride-DDT mixture in tests against several insects.

12704* Effects of Aldrin and Dieldrin on Germination and Early Growth of Field Crop Seeds. H. C. Cox and J. H. Lilly. *Journal of Economic Entomology*, v. 45, June 1952, p. 421-428.

Deals with effects of various levels of aldrin and dieldrin on germination and early growth of a variety of field crops grown commercially in the Middle West. Experiments were carried

out in the greenhouse under conditions far more severe than ordinarily encountered in the field.

12705* Toxicity of Several New Insecticides to Honey Bees. L. D. Anderson and T. O. Tuft. *Journal of Economic Entomology*, v. 45, June 1952, p. 446-469.

Reviews literature and presents results of experiments on a considerable number of the newer insecticides. Toxicity varied from very high to almost nontoxic. 12 ref.

12706* Metabolic Fate of DDT When Applied to Certain Naturally Tolerant Insects. James Sternburg and C. W. Kearns. *Journal of Economic Entomology*, v. 45, June 1952, p. 497-505.

Fate of DDT in 4 species of naturally resistant insects was investigated. All have the ability to degrade DDT to nontoxic metabolites.

12706a* The Effects of Volume Application-Rate on the Activity of 2:4-Dichlorophenoxyacetic Acid and 2-Methyl-4-Chlorophenoxyacetic Acid. K. Holly. *Journal of the Science of Food and Agriculture*, v. 3, July 1952, p. 308-312.

Results of a preliminary greehouse-experiment to determine above effects on the amount of spray retained by barley and *Brassica alba* are presented. Possible effects of volume-rate on peneration of 2,4-D and MCPA into plants and relation of environmental factors to the problem are discussed. Interpretation of results of field experiments is considered.

12707* The Chemical Control of Glasshouse Pests and Diseases. W. H. Read. *Journal of the Science of Food and Agriculture*, v. 3, Aug. 1952, p. 337-342.

Reviews the above in considerable detail. 21 ref.

12708* The Mode of Action of 2:4-Dichlorophenoxyacetic Acid and 2-Methyl-4-Chlorophenoxyacetic Acid. E. K. Woodford. *Journal of the Science of Food and Agriculture*, v. 3, Aug. 1952, p. 349-353.

Presents results of experimental investigation of toxicity and growth-regulating activity of above compounds. An examination of existing information concerning retention, penetration, transport and toxicity at site of action suggests that the different effects of 2,4-D and MCPA may be associated with differences in transport and persistence within the plant.

12709* The Relative Toxicity of 2:4-Dichlorophenoxyacetic Acid and 2-Methyl-4-Chlorophenoxyacetic Acid to Wheat, Oats, and Barley. H. P. Allen. *Journal of the Science of Food and Agriculture*, v. 3, Aug. 1952, p. 378-384 .

Correlates results reported by various investigators. 12 ref.

12710 Relation of Nitrogen Supply to the Molybdenum Requirement of Cauliflower Grown in Sand Culture. S. C. Agarwala. *Nature*, v. 169, June 28, 1952, p. 1099.

Discusses results of experiments on the above. 10 ref.

12711 Male Sterile Plants by Chemical Treatment. S. Rehm. *Nature*, v. 170, July 5, 1952, p. 38-39.

Shows that treatment with certain growth-regulating substances produces male sterility in cucurbitaceous plants and in tomatoes for periods of one to several weeks.

12712 Detoxication of Hormone Herbicides by Soil Bacteria. H. L. Jensen and H. Ingv. Peterson. *Nature*, v. 170, July 5, 1952, p. 39-40.

Data tabulated and discussed.

12713 Effects of Scopoletin on Indoleacetic Acid Metabolism. W. A. Andreae. *Nature*, v. 170, July 12, 1952, p. 83-84.

Describes effects of a scopoletin accumulation as observed in virus-infected potato and tobacco plants, in topped tobacco and in plants treated with 2,4-D acid. 13 ref.

12714 A New Approach to the Problems of the Spread of Aphids and to Insect Trapping. C. G. Johnson. *Nature*, v. 170, July 26, 1952, p. 147-148.

Reconsiders current views on the spread of aphids as well as the analysis of trap data in entomological research. 14 ref.

12715 Molybdenum in Relation to Cropping and Livestock Problems Under Irish Conditions. T. Walsh, M. Neenan, and L. B. O'Moore. *Nature*, v. 170, July 26, 1952, p. 149-150.

Discusses the nutritional disorders in livestock due to an excess of Mo in the diet. Results of tests conducted in Ireland are given.

12716 Using Half-Tree Plots for Increasing the Efficiency of Fungicide Tests. Saul Rich. *Phytopathology*, v. 42, July 1952, p. 353-354.

The use of half-tree plots does not decrease the amount of information concerning treatment differences, and in addition increases the number of treatments which can be tested. The half-tree method also gives a more reliable estimate of error because it is based on a greater number of degress of freedom. Table and graphs.

12717* A Simple Greenhouse Method for Evaluating Fungicides for Control of Cucumber Anthracnose. J. G. Atkins, Jr. and N. L. Horn. *Plant Disease Reporter*, v. 36, July 15, 1952, p. 270-272.

Describes experiments from which the above was derived. Results are tabulated.

12718* 1951 Summary of Results of Fungicide Tests in the United States and Canada. *Plant Disease Reporter*, Supplement 213, Aug. 15, 1952, p. 109-140.

12719* Chemical Agriculture. Francis Joseph Weiss. *Scientific American*, v. 187, Aug. 1952, p. 15-19.

Tells how farming is being revolutionized by new fertilizers, insecticides, fungicides, weed killers, leaf removers, soil conditioners, plant hormones, trace minerals, antibiotics, and synthetic milk for pigs.

12720* Insect Control by Chemicals. A. W. A. Brown. *Soap and Sanitary Chemicals*, v. 28, July 1952, p. 135-137.

Discusses especially acquired resistance and synergism and their countermeasures. 22 ref.

12721* Soil Science in the Netherlands. Firman E. Bear. *Soil Science*, v. 74, July 1952, p. 1-101.

A series of papers presented at 4th International Congress of Soil Science held in Amsterdam in 1950. Entire issue is devoted to Dutch techniques in soil science and food production.

12722* The Influence of the Plant Growth-Regulator, 2-Methyl-4-Chlorophenoxyacetic Acid, on the Metabolism of Carbohydrate, Nitrogen and Minerals in *Solanum Lysoperiscum* (Tomato). A. Rhodes. *Journal of Experimental Botany*, v. 3, June 1952, p. 129-154.

12723* Research in Private Institutes of the U. S. A. K. Starr Chester. *World Crops*, v. 4, Aug. 1952, p. 278-280.

Supervisor of Agricultural Research, Battelle Memorial Institute, describes the activities of various research institutes in the U. S., especially in the agricultural field.

Miscellaneous Publications

12724 Preliminary Study of Sterilizing Tobacco Stems Against Mosaic Diseases. E. G. Beinhart and O. D. Morgan. U. S. Department of Agriculture, Eastern Regional Research Laboratory, AIC-334, Apr. 1952, 6 pages.

Conditions required for sterilization: effects of temperature, time of exposure, and moisture content of the stems.

Books

12725 Annual Review of Plant Physiology. Daniel I. Arnon and Leonard Machlis, editors. 369 pages. 1952. Annual Reviews, Inc., Stanford, Calif. (QK710 A77p)

Contains following articles: "Factors Affecting Availability of Inorganic Nutrients in Soils With Special Reference to Micro-Nutrient Metals", G. W. Leeper; "Glycolytic Enzymes in Higher Plants", P. K. Stumpf; "Metabolism of Phosphorylated Compounds in Plants", H. Albaum; "Studies of the Physiology, Pharmacology, and Biochemistry of the Auxins", J. Bonner and R. S. Bandurski; "Agricultural Application of Growth Regulators and Their Physiological Basis", J. van Overbeek; "Transport of Organic Compounds", W. H. Arisz; "Leaf Proteins", S. Wildman and A. Jagendorf; "Physiological Aspects of Low Temperature Preservation of Plant Products", M. A. Joslyn

31. *Agricultural Research*

and H. C. Diehl; "Physiology of Virus Diseases", F. C. Bawden and N. W. Pirie; "Mechanisms of Ion Absorption by Roots", R. Overstreet and L. Jacobson; "Physiological Bases for Assessing the Nutritional Requirements of Plants", A. Ulrich; "Photosynthesis", E. Rabinowitch; "Physiology of Flowering", A. Lang; "Carboxylating Enzymes in Plants", B. Vennesland and E. E. Conn; and "Tree Physiology", B. Huber.

12726 Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. V. Forest Resources. Vol. VI. Land Resources. 325 and 629 pages. 1951. Department of Economic Affairs, United Nations, New York. (HC13 Un3p)

Vol. V deals with inventories, protection, management, protective functions, and administration of forests; logging and sawmill techniques; and preservation and chemical utilization of wood. Vol. VI covers conservation and improving productivity of soil; aids to farming; plant and livestock breeding; plant protection; grazing lands; new agricultural lands; storage and preservation of agricultural products; and feeding, diseases, and pests of livestock.

See also:
12026 (determination of spray residues)
12211 (toxicity of DDT aerosols)
12990 (atomic energy in plant science)

32. PHYSICS

12727* General Theory of Sound Absorption in Gases and Liquids With Consideration of Transport Phenomena. (German.) J. Meixner. *Acustica*, v. 2, no. 3, 1952, p. 101-109.

Mathematical and theoretical. 19 ref.

12728* Linear Magnetostrictive Ultrasonics Production by Means of Crossed Magnetic Fields. (German.) H. H. Rust and E. Bailitis. *Acustica*, v. 2, no. 3, 1952, p. 132-135.

Apparatus, procedures, and theory.

12729* The Mathematical Theory of Stationary Dislocations. F. R. N. Nabarro. *Advances in Physics*, v. 1, July 1952, p. 269-394.

A lengthy treatise on the above. Discussion covers dislocations in an elastic continuum and effect of the crystal structure. Diagrams and graphs. 111 ref.

12730* Nozzle Characteristics in High-Vacuum Flows—Rarefied Gas Dynamics. R. G. Folsom. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 915-918.

Presents a limited number of results of experiments on small ASME shaped nozzles at very low Reynolds Numbers, achieved by operating at extremely low pressures over a wide range of pressure ratios. Graphs and tables.

12731* Basic Difficulties in Pulsating-Flow Metering. A. R. Deschere. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 919-923.

Comprehensive discussion of the above includes a lengthy list of references (83) concerned with pulsating-flow measurement and metering.

12732* Heat Transfer and Fluid Friction During Flow Across Banks of Tubes. IV. A Study of the Transition Zone Between Viscous and Turbulent Flow. O. P. Bergelin, G. A. Brown, and S. C. Doberstein. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 953-959; disc., p. 960.

Numerous graphs.

12733* Heat Transfer by Gas Conduction and Radiation in Fibrous Insulations. J. D. Verschoor and Paul Greebler. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 961-967; disc., p. 967-968.

Thermal-conductivity measurements were made on samples of an experimental glass-fiber insulation. Tests were carried out at atmospheric pressure with 4 different gases in the insulation samples, and thermal conductivity with air was studied over a pressure range of 1 μ to 760 mm. Hg. Methods are discussed for producing considerable reduction in the thermal conductivity of fibrous insulations.

12734* Heat Transfer and Pressure Drop for Turbulent Flow of Air-Water Mixtures in a Horizontal Pipe. H. A. Johnson and A. H. Abou-Sabe. *Transactions of the American Society of Mechanical Engineers*, v. 74, Aug. 1952, p. 977-984; disc., p. 984-987.

Flow rates include the range of 1000-15,000 lb. per hr. for the water and 0-200 lb. per hr. for the air. Tentative correlations are presented from which prediction of pressure drop and heat transfer may be made under restricted flow conditions. Tables and graphs. 30 ref.

12735* Research at Harwell. I. *Atomics* (London), v. 3, Aug. 1952, p. 201-205, 207. (A condensation.)

Review of fundamental research program in physics and chemistry at England's atomic-energy research establishment. (To be continued.)

12736 Design and Operation of a Mean Deviation Meter. L. H. Greenberg and W. W. Happ. *Canadian Journal of Physics*, v. 30, July 1952, p. 317-328.

An electronic instrument is described, which measures the statistical properties of a series of pulses arriving at irregular intervals.

12737 Statistics of the Mean Deviation Meter. E. S. Keeping and W. W. Happ. *Canadian Journal of Physics*, v. 30, July 1952, p. 329-341.

Mean deviation is evaluated for a number of distributions of a Poisson or similar type, such as arise with counters, scaling circuits, and in particular with the meter described by Greenberg and Happ. Exact expressions for density functions are given, and also approximations from which mean deviation can be calculated.

12738 Ferromagnetic Properties of the Manganese Zinc Ferrites. J. P. Adams. *Ceramic Age*, v. 60, July 1952, p. 20, 22.

Brief discussion, with information on properties, advantages, and electrical applications.

12739 Magnetic Properties of the Chromites. T. R. McGuire, Louis N. Howard, and J. Samuel Smart. *Ceramic Age*, v. 60, July 1952, p. 22-24.

A study of Mn, Co, Ni, Cu, Zn, and Mg chromites with graphical data on reciprocal magnetic susceptibility and tabular data on paramagnetic constants.

12740* Pressure Drop for High Vacuum Flow of Air Through Annular Sections. Charles R. Alancraig and LeRoy A. Bromley. *Chemical Engineering Progress* (Engineering Section), v. 48, July 1952, p. 357-361.

Isothermal flow of air at room temperature through 4 commercially smooth horizontal concentric copper annuli, 3 in. o.d. was studied by measurement of pressure differentials and flow rates. In the transition region between molecular flow and viscous flow, the flow was found to be the sum of the viscous and molecular flow contributions. 14 ref.

12741* The Flow Pattern of a Supersonic Projectile. G. B. Whitham. *Communications on Pure and Applied Mathematics*, v. 5, Aug. 1952, p. 301-348.

Mathematical analysis plus graphical interpretation. 13 ref.

12742* Paramagnetic Properties of Some Hexaborides of the Rare Earths. (French.) René Benoit and Pierre Blum. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 16, 1952, p. 2428-2430.

Reports on studies made on the susceptibility of some hexaborides at varying temperatures. Results are charted.

12743* Magnetic Properties of Aqueous Copper Nitrate Solutions. (French.) Paulette Berthier, Clément Courty, and Jean Authier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 23, 1952, p. 2525-2527.

Tabulates the results of experiments with $Cu(NO_3)_2$, confirming fact that the paramagnetism of Cu salts increases upon dissolution.

12744* Carrier Concentrations and Fermi Levels in Semiconductors. J. S. Blakemore. *Electrical Communication*, v. 29, June 1952, p. 131-153.

In this review, the statistical theory of free carrier concentrations and the Fermi level is developed for semiconductors under a wide range of conditions using Fermi-Dirac statistics. Published material has been coordinated and tabular and graphical information added to facilitate calculation. 23 ref.

12745 The Diffusion of Thoron in Solids. Part 3. Diffusion and Recoil in Multimolecular Films of Barium Stearate by Emanating Power Measurements. J. N. Gregory, J. F. Hill, and S. Moorbath. *Transactions of the Faraday Society*, v. 48, July 1952, p. 643-651.

12746* Single-Crystal Germanium. G. K. Teal, M. Sparks, and E. Buehler. *Proceedings of the I.R.E.*, v. 40, Aug. 1952, p. 906-909.

Discusses the single-crystal Ge now being employed for transistors and for the parallel development of a variety of rectifier and photocell devices. Graphs. 12 ref.

12747* Radiochemical Reactions in Nuclear Reactors. I. Formation of Oxygenated Water by Irradiation of Borate Solutions. J. Pucheault, M. Lefort, and M. Haïssinsky. **II. Influence of Electrolytes on Formation, and Decomposition of Oxygenated Water.** M. Haïssinsky and J. Pucheault. (French.) *Journal de Chime Physique et de Physico-Chimie Biologique*, v. 49, May 1952, p. 286-301.

Part I discusses the mechanism of formation of oxygenated water. Part II reports on studies with the Chatillon pile, and with H^3, H^4, and Li^7. Results are indicated, and compared with data from the literature.

12748* On Weak Interaction of Strong Shock and Mach Waves Generated Downstream of the Shock. Boa-Teh Chu. *Journal of the Aeronautical Sciences*, v. 19, July 1952, p. 433-446.

Theoretical, mathematical analysis. 15 ref.

12749* The Effect of Nonuniform Surface Temperature on the Transient Aerodynamic Heating of Thin-Skinned Bodies. A. E. Bryson and R. H. Edwards. *Journal of the Aeronautical Sciences*, v. 19, July 1952, p. 471-475.

A quasi-steady analysis is given of the transient forced-convection heating of bodies with thin metallic skins, where the boundary layer is laminar, taking into account the effect of nonuniform surface-temperature distribution on rate of heat transfer. Results are compared with previous analyses.

12750* Thermal Stress in Power-Producing Elements. A. S. Thompson. *Journal of the Aeronautical Sciences*, v. 19, July 1952, p. 476-480.

Considers the stresses in a material resulting from the flow of power through it, when the density of power generated has a given distribution. From Hooke's law relating elastic stresses and strains, a general expression is derived for order of magnitude of the thermal stress produced by a temperature difference in the material. The special case of the stress in a heated cylindrical tube with a given distribution of power density and with heat flow through its inner surface is studied.

12751* On the Boundary-Layer Equations in Hypersonic Flow. S. F. Shen. *Journal of the Aeronautical Sciences*, v. 19, July 1952, p. 500-501.

Mathematical analysis.

12752* A Solution of the Laminar Boundary-Layer Equations for a Compressible Fluid With Variable Properties, Including Dissociation. L. L. Moore. *Journal of the Aeronautical Sciences*, v. 19, Aug. 1952, p. 505-518.

Above equations are solved for a flat plate in compressible flow where equilibrium dissociation of the air is assumed, as well as variable air properties. Evaluation of skin-friction and heat-transfer characteristics is made for a Mach Number range 1-20. Both the insulated plate without radiation and the plate with heat transfer are considered. 15 ref.

12753 Dielectric Dispersion in Materials Having a Distribution of Relaxation Times. J. Ross MacDonald. *Journal of Chemical Physics*, v. 20, July 1952, p. 1107-1111.

Concerned with an extension of the treatment of Fuoss and Kirkwood of dielectric dispersion in materials exhibiting a distribution of relaxation times. 12 ref.

12754 Paramagnete Resonance of Manganese Activated Zinc Orthosilicates. E. G. Spencer, M. A. Garsten, C. C. Klick, and J. H. Schulman. *Journal of Chemical Physics*, v. 20, July 1952, p. 1177-1178.

Further measurements were made to determine the effects of addition of Be to form $(Zn,Be)_2SiO_4{\cdot}Mn$. This system was chosen for study because of the interest shown in it in discussion of sources of emissions in phosphors. Data charted.

12755* The Luminescence of Organic Substances. E. J. Bowen. *Nucleonics*, v. 10, July 1952, p. 14-18.

Mechanism of the process is discussed here for the case of ultraviolet light, with extension to the case of nuclear radiations. 10 ref.

12756* Pulse-Amplitude Analysis in Nuclear Research. Part I. Voltage Discriminators. A. B. Van Rennes. *Nucleonics*, v. 10, July 1952, p. 20-27.

Introduces the analysis problem and discusses the requirements of voltage-selection devices. A number of different voltage-discrimination techniques are treated in detail. 16 ref.

12757* Chemical Dosimetry Using Ferrous and Ceric Sulfates. Jerome Weiss. *Nucleonics*, v. 10, July 1952, p. 28-31.

High-level dosimeters are a major need for fission-product research. Results with aqueous $FeSO_4$, for use under 50,000 rep., and $Ce(SO_4)_2$ for use up to 12,000,000 rep. are reproducible and independent of dose rate and intensity over wide ranges. 10 ref.

12758* Pulse-Amplitude Analysis in Nuclear Research. Part II. Single-Channel Differential Analyzers. A. B. Van Rennes. *Nucleonics*, v. 10, Aug. 1952, p. 22-28.

Circuits for a simple sweep-type, a moderate-precision, and a precision analyzer are treated in detail. Operating principles and design requirements are discussed. 15 ref.

12759* Calutron Charge Materials for Stable-Isotope Separation. C. P. Keim. *Nucleonics*, v. 10, Aug. 1952, p. 29-31.

Stable isotopes are enriched in Oak Ridge mass spectrographs called calutrons. A summary of the materials so far successfully processed is given. It tells, in effect, the story behind AEC's large inventory of stable isotopes, four-fifths of whose users are non-AEC labs. Table gives charge materials, temperature range, and collector materials used in stable-isotope separations.

12760* Transfer Function of Argonne CP-2 Reactor. J. M. Harrer, R. E. Boyar, and Darwin Krucoff. *Nucleonics*, v. 10, Aug. 1952, p. 32-36.

The kinetic behavior of CP-2 was determined for sinusoidal variations of reactivity. Variations of phase and amplitude of the neutron density were both measured and calculated. Graphs.

12761* Discrimination Against Noise in Scintillation Counters. R. J. T. Herbert. *Nucleonics*, v. 10, Aug. 1952, p. 37-39.

The gating system described depends for its efficiency on phosphors with particular decay rates. It offers the convenience of a gamma counter that requires no cooling and in which photomultiplier noise is reduced by a factor of 250 at normal operating voltages. 10 ref.

12762* Temperature Effects in Organic Fluors. S. H. Liebson. *Nucleonics*, v. 10, July 1952, p. 41-45.

Little is yet known about the energy-transfer mechanism or energy states of organic fluorine compounds. Their decay times have been found to decrease or remain constant with decrease in temperature. The author's observations are presented and related to research done since the first organic scintillators were used in 1947. 27 ref.

12763* High-Energy Particles and the Scintillation Counter. L. F. Wouters. *Nucleonics*, v. 10, Aug. 1952, p. 48-53.

Particle-scattering and meson experiments carried out with G.M. and proportional counters involve long counting times if accuracy is to be obtained. The scintillation counters de-

32. *Physics*

scribed, coupled with high-speed electronic circuits, can be used to collect more accurate data in much less time.

12764* Neutron-Detecting Phosphors. James Schenck. *Nucleonics*, v. 10, Aug. 1952, p. 54-56.

Testing of over 300 phosphor samples has led to development of a variety of scintillators containing Li. Previous experimental work and suggested methods for producing neutron-induced luminescence are reviewed. 10 ref.

12765* Low-Level Counting Techniques. Arthur J. Freedman and Ernest C. Anderson. *Nucleonics*, v. 10, Aug. 1952, p. 57-59.

With the same statistical error, counting time was reduced by a factor of 3, using pulse-height discrimination with a $C^{14}O_2$-filled proportional counter. Equations relating sample-to-background ratio to statistical error are derived. Graphs.

12766* Radiometric Properties of the Thorium Series. James Fresco, Evelyn Jetter, and John Harley, *Nucleonics*, v. 10, Aug. 1952, p. 60-64.

Activity curves of groups in the Th series are applied as a basis for the analysis of Th and its daughter products by α and β counting, and for calculation of approximate β surface dose rates. Graphs.

12767* Transfer and Transport of Energy by Resonance Processes in Luminescent Solids. P. J. Botden. *Philips Research Reports*, v. 7, June 1952, p. 197-235.

Detailed discussion of the above includes: explanations for the phenomena in sensitized phosphors and experimental results; explanation of the energy transfer in sensitized systems; and theoretical treatment of the transfer processes in sensitized phosphors on the basis of the theory of Mott and Seitz. Numerous graphs and tables. 68 ref.

12768* New Phosphors for Fluorescent Lamps. J. L. Ouweltjes. *Philips Technical Review*, v. 13, June 1952, p. 346-351.

Discusses the advantages of the discovery of halophosphate phosphors which has made it possible to obtain white light with only one phosphor. Graphs.

12769* Experiments on Separation of Boundary Layers on Probes in Front of Blunt-Nosed Bodies in a Supersonic Air Stream. W. A. Mair. *Philosophical Magazine*, ser. 7, v. 43, July 1952, p. 695-716.

Schlieren photographs of above type of flow were taken for bodies of revolution with hemispherical and flat noses and various lengths of probe, at a Mach number of 1.96. Measurements of pressure distribution were also made on the hemispherical-nosed body for one length of probe. Numerous graphs and diagrams. 11 ref.

12770* Anti-Ferromagnetic Resonance in Copper Chloride. (English.) J. Ubbink, J. A. Poulis, H. J. Gerritsen, and C. J. Gorter. *Physica*, v. 18, June-July 1952, p. 361-368.

Resonance absorption of $CuCl_2 \cdot 2H_2O$ in the antiferromagnetic state was investigated at a frequency of about 9400 MHz. at different temperatures with different orientations of the external field with respect to the crystalline axes.

12771* Behaviour of a Single Crystal of $CuCl_2 \cdot 2H_2O$ Near the Néel Temperature. N. J. Poulis and G. E. G. Hardeman. *Physica*, v. 18, June-July 1952, p. 429-432.

12772* Spontaneous Magnetization of Nickel Zinc Ferrite as a Function of the Nickel Zinc Ratio. (English.) K. F. Niessen. *Physica*, v. 18, June-July 1952, p. 449-468.

Mathematical analysis based on theory and data reported by other investigators. Graphical interpretation.

12773* Luminescence of Alkaline Iodides. (French.) J. Bonanomi and J. Rossel. *Physica*, v. 18, June-July 1952, p. 486-488.

Luminescence of LiI, NaI, KI, RbI, and CsI, with and without Tl activation, was studied between 77 and 300°K., using a scintillation counter. Results are charted and discussed.

12774 Ferroelectricity in the Ilmenite Structure. H. C. Schweinler. *Physical Review*, ser. 2, v. 87, July 1, 1952, p. 5-11.

Theoretical study of ferroelectricity of the ilmenite structure of lithium tantalate and lithium niobate, using the method recently introduced by Slater for barium titanate. Diagrams.

12775 Energy of a Bloch Wall on the Band Picture. II. Perturbation Approach. Conyers Herring. *Physical Review*, ser. 2, v. 87, July 1, 1952, p. 60-70.

Detailed discussion of the above includes treatment of equations and their solutions of the perturbation approach; interpretation in terms of precessing spins; the case of free electrons; and relation to Slater's theory.

12776 Induced Conductivity and Light Emission in Different Luminescent Type Powders. Hartmut Kallman and Bernard Kramer. *Physical Review*, ser. 2, v. 87, July 1, 1952, p. 91-107.

The currents induced in various (Zn:Cd)S luminescent-type powders by ultraviolet radiation were investigated, as well as the quenching and stimulating effects due to infrared radiation. Similar experiments on fluorescent emission were also carried out. Results are discussed. Numerous graphs and tables. 17 ref.

12777 Electroluminescence of Single Crystals of ZnS:Cu. William W. Piper and Fred E. Williams. *Physical Review*, ser. 2, v. 87, July 1, 1952, p. 151-152.

Above crystals were prepared and found to luminesce upon application of a.c. or d.c. The mechanism of this phenomenon is discussed briefly.

12778 Antiferromagnetic Arrangements in Ferrites. Y. Yafet and C. Kittel. *Physical Review*, ser. 2, v. 87, July 15, 1952, p. 290-294.

The molecular field treatment of the magnetic properties of ferrites given by Néel is extended to take into account the antiferromagnetic exchange interactions within the two magnetic sublattices. Neutron-diffraction experiments and specific-heat measurements are suggested for detection of the predicted arrangements.

12779 A Study of the Electron Traps in Zinc Sulfide Phosphor. Allan W. Smith and John Turkevich. *Physical Review*, ser. 2, v. 87, July 15, 1952, p. 306-308.

Thermoluminescence characteristics of a hexagonal Cu-activated ZnS phosphor were measured as a function of wavelength of the exciting light. The results are interpreted to mean that light which is capable of filling the traps is also capable of stimulating electrons out of the traps.

12780 The Influence of Anistropy of Ferromagnetic Relaxation. N. Bleombergen and Shyh Wang. *Physical Review*, ser. 2, v. 87, July 1952, p. 392-393.

Experiments on relaxation effects in ferromagnetic resonance were extended to other samples of nickel ferrite, other types of ferrites, and to lower temperatures. It was found that the saturation curves coincide in polycrystalline specimens.

12781 Wall Energy of Ferroelectric Domains. W. Känzig. *Physical Review*, ser. 2, v. 87, July 15, 1952, p. 385.

Gives a simple tentative explanation of the behavior of small ferroelectric particles reported in a previous letter.

12782 Electron-Hole Recombination in Germanium. R. N Hall. *Physical Review*, ser. 2, v. 87, July 15, 1952, p. 387.

Power rectifiers have been described that consist of thin wafers of high-purity Ge whose opposite faces are heavily doped with donor and acceptor impurities. Since current flow depends largely upon generation and recombination of holes and electrons within the high purity region, this geometry is well adapted to study of the recombination process. Results are charted and analyzed.

12783 High Frequency Electrical Breakdown of Gases. W. P. Allis and Sanborn C. Brown, *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 419-424.

Previous theoretical treatments of the above based on the Boltzmann transport equation and applied to specific gases met with mathematical difficulties when applied to higher pressures. Presents a simple solution applicable to any gas

and to a wide pressure range. Agreement between theory and experiment with hydrogen gives confidence that the energy-distribution function is correct. This function is therefore used to compute other quantities of physical interest.

12784 The Hall Effect in Single Crystals of Barium Oxide. E. M. Pell. *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 457-462.

Hall effect was measured as a function of temperature, between 400 and 800°K., in single crystals of barium oxide using an a.c. system. Conduction was predominantly N-type. 23 ref.

12785 The Coherent Neutron Scattering Cross Sections of Nitrogen and Vanadium. S. W. Peterson and Henri A. Levy. *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 462-463.

Neutron-diffraction measurements on vanadium nitride, vanadium carbide, and potassium azide show the coherent neutron scattering cross section of nitrogen to be 11.1±0.3 barns, positive phase; and that of vanadium to be 0.029±0.01 barn, negative phase. 11 ref.

12786 Copper as an Acceptor Element in Germanium. C. S. Fuller and J. D. Struthers. *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 526-527.

Experiments outlined do not indicate formation of experimental results reported. They strongly suggest that Cu is a surface impurity responsible for the familar "thermal conversion" of Ge. In a previous publication, solid solubilities of thermal acceptors and their diffusion rate in Ge were given. In the present work, solid solubility and diffusion constant of Cu were determined with radioactive Cu. Data for the thermal acceptor and for Cu agree within the limit of error of the experiments. Graphs.

12787 Impurity Effects in the Thermal Conversion of Germanium. W. P. Slichter and E. D. Kolb. *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 527-528.

Experiments outlined do not indicate formation of thermal acceptors as a consequence of the growing process and show that conversion may be associated with the presence of impurities on the Ge surface prior to heating.

12788 Thermoluminescence and Changes of Color Centers in LiF. J. Sharma. *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 535.

Outlines results of experiments. Curve gives the thermoluminescence record of LiF excited with cathode rays at liquid-oxygen temperature.

12788a Rectification Phenomena Exhibited by Natural and Sulphurized Galena. A. L. Reimann and J. V. Sullivan. *Proceeding of the Physical Society*, v. 65, sec. B. July 1, 1952, p. 480-487.

Specimens of n-type galena were sulfurized, either by a wet chemical process or by exposure to sulfur vapor at various temperatures, and the resulting changes in rectification characteristics were observed, both with d.c. instruments, and at 3000 Mc./s. Results are briefly discussed in the light of present-day rectification theory. Graphs.

12788b The Flow of Solids. B. Gross. *Physics Today*, v. 5, Aug. 1952, p. 6-11.

Discusses fundamental principles of the above.

12789 The Thermionic Constants of Metals and Semi-Conductors. I. Graphite. S. C. Jain and K. S. Krishnan. *Proceedings of the Royal Society*, ser. A, v. 213, June 24, 1952, p. 143-157.

Thermionic constants of graphite were determined by finding by Knudsen's effusion method the saturation vapor pressure of the electron gas in a graphite chamber, at different known temperatures, and applying the well-known Clapeyron-Clausius thermodynamic relation. Measurements are also reported for the spectral emissivity of graphite for electromagnetic radiations in the neighborhood of 6550°A at different temperatures. Apparatus diagram and graphs. 29 ref.

12790 Electrical Breakdown of Gases. I. Spark Mechanism in Air. F. Llewellyn Jones and A. B. Parker. **II. Spark Mechanism in Nitrogen.** J. Dutton, S. C. Haydon, and F. Llewellyn Jones. *Proceedings of the Royal Society*, ser. A, v. 213, June 24, 1952, p. 185-214.

Part I analyzes literature data on growth of photoelectric currents and discusses theoretically and gives experimental results on secondary ionization in relation to electrical breakdown. Part II presents measurements of growth of pre-breakdown ionization currents in uniform fields in N_2 measured over a range of the spark parameters and discusses mechanism involved. Apparatus diagrams, graphs, and tables. 22 ref.

12791 Low Energy Counting With a New Liquid Scintillation Solute. F. N. Hayes, R. D. Hiebert, and R. L. Schuch. *Science*, v. 116, Aug. 8, 1952, p. 140.

Briefly discusses use of 2,5-diphenyloxazole in toluene. Quenching action of a series of compounds for this solution is compared.

12792 A Note on the Phosphorescence of Proteins. P. Debye and John O. Edwards. *Science*, v. 116, Aug. 8, 1952, p. 143-144.

Outlines results of investigation on a series of proteins and amino acids. 10 ref.

12793 Electroluminescene—Electrical and Optical Properties. John F. Waymouth, Charles W. Jerome, and Warren C. Gungle. *Sylvania Technologist*, v. 5, July 1952, p. 54-59.

Electro-optical measurements on electroluminscent lamps are described. These include surface brightness, color, and efficiency. Variations of surface brightness with frequency and ambient temperature are discussed. Optical absorption and energy distribution of emitted radiation are examined. Graphs.

12794* Synthesis of Semiconductors, Their Thermoelectric Effects and Rectifier Properties. (Norwegian.) Tormod Forland. *Teknisk Ukeblad*, v. 99, Apr. 10, 1952, p. 277-282.

Discussion of principles includes diagrams and references.

12795* Magnetization and Microwave Resonance Adsorption of the Solid Solutions of Magnetic Ferrites and Cadmium Ferrite. (English.) Hiroshi Watanabe, Noboru Tsuya, and Takeshi Takahashi. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Feb. 1951, p. 62-65.

12796* Magnetic Resonance Absorption in Antiferromagnetic Materials. (English.) Tosihiko Okamura, Yosiharu Torizuka, and Yuzô Kojima. *Science Reports of the Research Institutes Tohoku University*, ser. A, v. 3, Apr. 1951, p. 209-213.

Microwave resonance absorptions in MnS, MnO, and MnSe, at 3.2 cm. wave-length were studied, using a specially designed rectangular cavity at low temperature. Curves of resonance absorption vs. d.c. magnetic field were obtained between 195 and 78°C. Results are discussed in comparison with theoretical studies of magnetic resonance in antiferromagnetic materials.

12797* Microwave Resonance Absorption in Magnetite at Low Temperature. (English.) Tosihiko Okamura and Yosiharu Torizuka. *Science Reports of the Research Institutes, Tohoku University*, ser. A. v. 3, Apr. 1951, p. 214-218.

Above was studied at 3.22 cm. in the range from room temperature to −185°C. Many graphs.

12798* Ferromagnetic Resonance Absorption in $NiOFe_2O_3$ and a New Magnetic Transition at Low Temperature. (English.) Tosihiko Okamura and Yosiharu Torizuka. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 219-222.

Microwave absorption phenomena similiar to those reported by Bickford for magnetic were observed for nickel ferrite. Measurements at a wave length of 3.2 cm. were made from room temperature to −195°C. A new magnetic transition at low temperature was found.

12799* On the Magnetic Transition of Nickel-Ferrite at Low Temperature. (English.) Tosihiko Okamura and Junzo Simoizaka. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 223-228.

Above was investigated by measuring magnetic properties and electrical conductivities at low temperatures. From the results, existence of the transition of nickel ferrite in the range 100-200°C. was confirmed. The problem of applying the Verwey model to the transition is discussed.

32. *Physics*

12800* On the Electric Conductivity of B_2O_3-Na_2O and B_2O_3-K_2O Systems in Fused Glassy State. (English.) Susumu Kinumaki and Keibun Sasaki. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 3, Apr. 1951, p. 258-264.

Apparatus described and diagrammed; data tabulated, charted, and discussed.

12801 New Trends in Vacuum Research Based on Ionisation Phenomena. A. von Engel. *Vacuum*, v. 1, Oct. 1951, p. 257-265.

Discusses measurement of high vacua, calibration of pressure gages for ultra-high vacua, production of ultra-high vacua, and preparation of extremely pure helium. Schematic diagrams. 16 ref.

Miscellaneous Publications

12802 Span Load Distributions Resulting From Angle of Attack, Rolling, and Pitching for Tapered Sweptback Wings With Streamwise Tips Supersonic Leading and Trailing Edges. John C. Martin and Isabella Jeffreys. National Advisory Committee for Aeronautics, Technical Note 2643, July 1952, 146 pages. (TL570 Un3t)

Results of the analysis are presented as an extensive series of design charts. Some illustrative variations of the spanwise distribution of circulation with the various design parameters are also given. Numerous tables.

12803 The Aerodynamic Design of High Mach Number Nozzles Utilizing Axisymmetric Flow With Application to a Nozzle of Square. Test Section. Ivan E. Beckwith, Herbert W. Ridyard, and Nancy Cromer. National Advisory Committee for Aeronautics, Technical Note 2711, June 1952, 30 pages. (TL570 Un3t)

Diagrams and tables. 10 ref.

12804 On the Application of Transonic Similarity Rules. John R. Spreiter. National Advisory Committee for Aeronautics, Technical Note 2726, June 1952, 45 pages. (TL570 Un3t)

Transonic aerodynamic characteristics of wings of finite span are discussed. Relation between the two methods of analysis of transonic flow is examined, the similarity rules and known solutions of transonic flow theory are reviewed, and the asymptotic behavior of wings of large and small aspects ratio is discussed. Diagrams. 30 ref.

12805 Method for Calculation of Heat Transfer in Laminar Region of Air Flow Around Cylinders of Arbitrary Cross Section (Including Large Temperature Differences and Transpiration Cooling). E. R. G. Eckert and John N. B. Livingood. National Advisory Committee for Aeronautics, Technical Note 2733, June 1952, 71 pages. (TL570 Un3t)

Calculation charts, graphs, and diagrams. 36 ref.

12806 Experimental Investigation of the Local and Average Skin Friction in the Laminar Boundary Layer on a Flat Plate at a Mach Number of 2.4. Randall C. Maydew and Constantine C. Pappas. National Advisory Committee for Aeronautics, Technical Note 2740, July 1951, 22 pages. (TL570 Un3t)

Above was studied for a Reynolds-number range 0.72-2.8 x 10^6 and compared with the laminar-boundary-layer theory of Chapman and Rubesin. Average skin-friction coefficients as plotted were 37-94% higher than values predicted by theory. Graphs and equipment diagrams.

12807 Boundary-Layer Development and Skin Friction at Mach Number 3.05. Paul F. Brinich and Nick S. Diaconis. National Advisory Committee for Aeronautics, Technical Note 2742, July 1952, 49 pages. (TL570 Un3t)

Boundary-layer studies consisting of schlieren observations and momentum surveys were made on hollow cylinder models with their axes alined parallel to the stream. Results were obtained for 3 model diameters and for natural and artifically-induced turbulent boundary-layer flows. Diagrams, photographs, and graphs. 12 ref.

12808 Practical Calculation of Second-Order Supersonic Flow Past Nonlifting Bodies of Revolution. Milton D. Van Dyke. National Advisory Committee for Aeronautics, Technical Note 2744, July 1952, 62 pages. (TL570 Un3t)

Diagrams and extensive tables. 10 ref.

12809 The Use of Semi-Conductors as Detectors of X Radiation. John E. Jacobs. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 331-336. (TK161 N21p)

Problems encountered are divided into 3 broad groups: control during production of the semiconductor; secondary radiation; and instrumentation.

12810 Correlation of Temperature and Electric Fields in a Material Undergoing Dielectric Heating. J. A. M. Lyon. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 475-488. (TK161 N21p)

An expression relating temperature, electric-field intensity, and time for a material undergoing dielectric heating is derived. This expression was checked by heating a wedge-shaped plastic sample, and comparing experimental and calculated temperature distribution. Method of measuring dielectric properties is also discussed, and equipment used to heat the sample described.

12811 Instrumentation of the Free-Air Supersonic Aerodynamic Test Facility. James S. Coe. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 489-496. (TK161 N21p)

Described and illustrated.

Books

12812 Engineering Thermodynamics. Ed. 2. Newton C. Ebaugh. 398 pages. 1952. D. Van Nostrand Co., New York. TJ265 Eb16e2)

Arranged primarily as a text for students who have studied general physics, inorganic chemistry, and mathematics through the calculus. New developments both in the fundamental data and in the applications of thermodynamics are incorporated in this edition. Also, 4 new chapters have been added to broaden the field of applications as well as the adaptabilty of the book for teaching.

12813 Astrophysics: A Topical Symposium. J. A. Hynek, editor. 701 pages. 1951. McGraw-Hill, New York. (QB461 H99a)

14 articles arranged under 4 general headings: spectroscopic astrophysics; physics of the solar system; physics of binary and variable stars; anl physics of cosmic matter. Tables, graphs, spectrographs, diagrams, photographs, and numerous references.

12814 Écoulements des Fluides Compressibles. (Flow of Compressible Fluids). (French.) R. Sauer. 307 pages. 1951. Librairie Polytechnique Ch. Béranger, Paris and Liege. (QA911 Sa87e)

Includes analytical methods and the numerical and graphic processes used in study of the above. Discusses linear theory of stationary and nonstationary flow, theory of stationary supersonic flow and continuous pressure waves of great intensity, method of using the theory of characteristics, theory of stationary subsonic flow, basic laws of the shock wave, and shock waves in stationary and nonstationary flow.

12815 Space-Time Structure. Erwin Schrödinger. 119 pages. 1950. Cambridge University Press, London. (QC6 Sch75s)

Investigates the geometry of the space-time continuum underlying Einstein's general theory of relativity, and describes some recent attempts to generalize it. The peculiar features of the book originate in work on *affine connexion* by Weyl, Einstein, Eddington, Eisenhart, and the author.

12816 Optika v Voennom Dele. Tom I. (Optics in Military Science. Vol. I.) Ed. 3. S. I. Vavilov and M. V. Sevastianova, editors. 392 pages. 1945. Academy of Science of the USSR, Moscow and Leningrad. (QC371 v4703)

Consists of 15 chapters by specialists in the respective fields: "Nature and Properties of Light", M. A. Elvashevich; "Geometric Optics and Design of Optical Systems", D. S. Volosov; "Optical Glass", K. S. Evstropev and A. I. Stozharov; "Light Filters", L. A. Ventman; "Photoelectric Cells", V. V. Balakov; "Application of Luminescent Materials in Military Science", A. N. Sevchenko and P. P. Feofilov; "Basic Information Concerning the Operation of the Eye", L. N. Gassovsky; "Light Conditions at Night and Vision in Darkness", A. I. Kolyadin;

"Distance Vision and Translucence of the Atmosphere", N. E. Rutyn; "Light Camouflage", A. A. Gershun; "Principles of Military Optical Camouflage and Decamouflage", M. M. Gurevich and E. K. Putseiko; "Photolenses", K. S. Andronnikov and A. L. Kuritskii; "The Photographic Process", G. P. Faerman; "Optical Telephony", V. V. Balakov; and "Optical Blocking", N. E. Rityn.

12817 Les Propriétés Optiques des Lames Minces Solides. (French.) (Optical Properties of Thin Solid Films.) 176 pages. 1950. Centre National de la Recherche Scientifique, Paris. (TN690 F84p)

A collection of articles by American, British, and French scientists which discuss the above with respect to theoretical research, various techniques for the preparation of film, experimental research on optical properties, and diversified applications. Presented at Marseille, Apr. 19-23, 1949.

See also:
11844 (mechanism of high-vacuum sputtering)
12305 (control and stability of aircraft)
12307 (control and stability of aircraft)
12311 (niobate and tantalate dielectrics)
12872 (photomultipliers for scintillation counting)
12974 (Russian meteorology text)

33. ELECTRICITY AND ELECTRONICS

12818* Electronic Controls as Applied to Aircraft Inverters. B. M. Starr. *Aeronautical Engineering Review*, v. 11, Aug. 1952, p. 36-41.

Diagrams, graphs, and illustrations.

12819 Capacitor Arc Discharge. M. W. Sims. *Aero Digest*, v. 65, July 1952, p. 40, 42, 44, 46.

Discussion of the electrical process necessary to the understanding of capacitor discharge for jet-engine ignition. Circuit diagrams.

12820 Network Synthesis Using Tchebycheff Polynomial Series. Sidney Darlington. *Bell System Technical Journal*, v. 31, July 1952, p. 613-665.

A general method is developed for finding functions of frequency which approximate assigned gain or phase characteristics, within the special class of functions which can be realized exactly as the gain or phase of finite networks of linear lumped elements. Graphs. 12 ref.

12821 Photoelectric Properties of Ionically Bombarded Silicon. Edwin F. Kingsbury and Russel S. Ohl. *Bell System Technical Journal*, v. 31, July 1952, p. 802-815.

The effects of the temperature of the target and of the energy of the bombarding particles in the photoelectric properties is illustrated by characteristic curves. Relative equi-energy spectral response characteristics as a function of wavelength are shown. Also gives photon efficiency as a function of wavelength for a typical cell. Graphs.

12822 A Note on the Sensitivity of Electrical Bridge Networks. M. Romanowski and A. F. Dunn. *Canadian Journal of Physics*, v. 30, July 1952, p. 342-347.

Presents an analytical solution to the problem of determining a scale reading when the bridges are very nearly, but not quite, balanced, which reading corresponds to the true null position, and of assessing the precision of such a determination.

12823* The Magnetron in the Static Region of a Cut. Experimental Study. (French.) Jean-Loup Delcroix. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, June 9, 1952, p. 2347-2349.

Reports on experimental study on the residual current in cylindrical magnetrons having c-a ratios of 1.25-7.5. The 3 stages observed in the experiments are interpreted.

12824* New Pulse Klystron Amplifier for the 960-1215-Megacycle Region. Carol Veronda. *Electrical Engineering*, v. 71, Aug. 1952, p. 686-689.

This klystron is a cascade amplifier developed expressly for crystal-controlled pulse operation in the above range for air navigational aids. It is designed for use either with a variable-duty or fixed-duty cycle. Some of the design concepts, tube design, and characteristics are discussed. Illustrated.

12825* Short-Circuiting Techniques for Deactivating a Faulty Aircraft Generator. Oscar Markowitz and J. W. Pobst. *Electrical Engineering*, v. 71, Aug. 1952, p. 703-705.

The method of generator protection described is the application of a short circuit between the generator output terminals thus disabling the power-generating capabilities of the machine. Circuit diagrams.

12826* Impulse Corona Detection and Measurement. J. H. Hagenguth and T. W. Liao. *Electrical Engineering*, v. 71, Aug. 1952, p. 706.

Brief discussion of how detection of impulse corona is accomplished by current measurements in a bridge circuit of a capacitive-resistive type.

12827* Polyethylene Terephthalate as a Capacitor Dielectric. M. C. Wooley, G. T. Kohman, and William McMahon. *Electrical Engineering*, v. 71, Aug. 1952, p. 715-717.

Describes the above compound, for use as the dielectric in electric capacitors. It is said to be superior in insulation resistance, temperature coefficient of capacitance, and operating temperature range, to the usual paper dielectric.

12828* A Series Magnetic Amplifier With Inductive Loading. T. G. Wilson. *Electrical Engineering*, v. 71, Aug. 1952, p. 729.

Analyzes and discusses the changes in current waveshape produced by variation of the circuit parameters.

12829* Reliability of 28-Volt D-C Aircraft Distribution Systems. K. W. Carlson and E. S. Sherrard. *Electrical Engineering*, v. 71, Aug. 1952, p. 731-735.

An analysis of protection of a typical 28-volt d.c. distribution system for large multi-engine aircraft is presented. Conclusions regarding bus and feeder fault protection and arrangement are included. Circuit diagrams.

12830* Bus-Bar Design for High-Frequency Induction Heating. J. W. Williamson. *Electrical Engineering*, v. 71, Aug. 1952, p. 736-739.

Considers the range of frequencies commonly generated by induction alternators, tabulating current-carrying capacity, resistance, and reactance per unit length for 10,000, 3,000, and 1,000 cycles. Equations applicable to much higher and lower frequencies are included. Graphs, tables, and diagrams.

12831* Power System Stability Criteria for Design. W. A. Morgan. *Electrical Engineering*, v. 71, Aug. 1952, p. 740-744.

Data presented are based on a study of the relative power limit for different types and locations of faults on an initial system that can be represented by 2 or 3 machines, and further studies of the relative effect of type of fault, location of fault, speed of clearing and reclosing the faulted line, and direction of power flow in the interconnecting tie circuit. Graphs and schematic diagrams.

12832 The Notched-Disk Memory. Jacob Rabinow. *Electrical Engineering*, v. 71, Aug. 1952, p. 745-749.

Above appears to be a very significant development in electromechanical information storage techniques. Its possible applications include such automatic information-processing activities as electronic computing, telephone switching, ticket reservations, optical recording, and business accounting. Photographs and schematic drawings.

12833* JIC Standards for Resistance Welding Transformers. *Electrical Manufacturing*, v. 50, Aug. 1952, p. 117, 322, 324, 326.

Presents completely new standard for welding-press transformers.

12834* U. S. Steel Fuels 60,000-Kw Unit With Blast Furnace Gas. W. P. Palmer. *Electrical World*, v. 138, July 28, 1952, p. 81-83.

New unit at U. S. Steel Co's South Works is largest ever designed for burning blast-furnace gas. It operates on steam at 850 psi., 900°F. Diagrams and illustrations.

12835 A Proposed Mechanism for Self-Discharge of the Leclanché Cell. Charles W. Jennings and W. C. Vosburgh.

33. *Electricity and Electronics*

Journal of the Electrochemical Society, v. 99, Aug. 1952, p. 309-316.

A procedure was developed by which MnO_2 electrodes can be reproduced within ±0.005 volt with MnO_2 prepared by precipitation or by thermal decomposition of $Mn(NO_3)_2$. Carbon mixed with either type of MnO_2 lowers the electrode potential when exposed to electrolyte. The electrochmical reaction involved is discussed. Numerous graphs. 15 ref.

12836 The Reproducibility of the Manganese Dioxide Electrode and the Change of Electrode Potential With pH. Richard S. Johnson and W. C. Vosburgh. *Journal of the Electrochemical Society*, v. 99, Aug. 1952, p. 317-322.

17 references.

12837 High Capacity Magnesium Dry Cells. R. C. Kirk, P. F. George, and A. B. Fry. *Journal of the Electrochemical Society*, v. 99, Aug. 1952, p. 323-327.

Describes Mg dry cells patterned after the conventional Leclanché cell. Contains a Mg alloy anode, MnO_2 + $BaCrO_4$ + acetylene-black cathode, $MgBr_2$ electrolyte inhibited with lithium chromate, and a paper separator. The cell is characterized by very high capacity, particularly when the load resistance is designed for the voltage level of the cell. Graphs and tables.

12838 Water-Activated Primary Cells Using Alkali Metal Persulfates as Depolarizers. I. C. Blake. *Journal of the Electrochemical Society*, v. 99, Aug. 1952, p. 328-332.

Describes cell developed which is similar to theAgCl-Mg cell but which has a 90% greater amp.-hr. output per unit of volume.

12839 A High Voltage Pile of the Zamboni Type. Paul L. Howard. *Journal of the Electrochemical Society*, v. 99, Aug. 1952, p. 333-3§7.

A new type of Zamboni pile was developed made up of cells consisting of a MnO_2-carbon black cathode, Al anode, an electrolyte of 0.25% $AlCl_3$, mixed with either a 5% methylcellulos-water solution or a 3.7% gelatin, 40-50% ethylene glycol-water solution, and a fibrous paper. Results indicate suitable performance at temperatures between 30 and 45°C. and at currents of 10^{-6}-10^{-12} amp.

12840 The Anniversary Issue on Primary Cell Systems. J. N. Mrgudich. *Journal of the Electrochemical Society*, v. 99, Aug. 1952, p. 179C-208C.

Consists of a series of review papers which cover systems being produced commercially or are ready for commercial production. Each discussion presents a concise review of the cell system involved and covers history, theory of operation, construction, operating characteristics, production data, and fields of application. Series consists of: "Dry Cells of the Leclanché Type, 1902-1952—a Review." George W. Heise and N. C. Cohoon; "Magnesium Primary Batteries." C. K. Morehouse; "The Alkaline Manganese Dioxide Dry Cell." W. S. Herbert ;"The Alkaline Cell With Copper Oxide or Air Depolarization (1902-1952)." Erwin A. Schumacher and George W. Heise; "The Alkaline-Mercury Oxide Cell." James M. Booe; "The Silver Peroxide-Zinc Alkaline Cell." Paul L. Howard; "The Cuprous Chloride-Magnesium Reserve Battery." L. E. Pucher; "The Lead Dioxide-Zinc Reserve-Type Cell." W. J. Schlotter; "The Chlorine-Zinc Primary Cell." Paul L. Howard; and "Thermal Batteries." Robert B. Goodrich and Richard C. Evans. 256 ref.

12841 The Potential and Coulombic Capacity of Some Galvanic Cell Systems. Allan Walkley. *Journal of the Electrochemical Society*, v. 99, Aug. 1952, p. 209C-214C.

Reviews the different electrochemical systems and relates the potentials and capacities observed with known properties of the active constituents. Emphasis is placed on the Leclanché dry cell. 65 ref.

12842* The Engineering of Radar Equipment Designed for the R.A.F. G. W. A. Dummer. *Electronic Engineering*, v. 24, Aug. 1952, p. 348-355.

Many factors which affect engineering design of the above are discussed. Faults due to components and to mechanical design are also treated. Suggestions are given for some essential engineering-design requirements based on post-war climatic testing and operational experience. Some trends in future engineering design are mentioned. Illustrated.

12843* A System of Pulse Code Modulation Using Circulated Pulses. S. Fedida. *Electronic Engineering*, v. 24, Aug. 1952, p. 356-361.

Describes a new method of converting sample pulses representing a certain intelligence into sequences of 5 on/off pulses which when interpreted as digits in a binary system of units reproduce the original amplitudes of the samples. Two possible methods of solving the reverse problem are also outlined. Circuit diagrams.

12844* Pulse Brightening Discrimination. A. L. Whitwell. *Electronic Engineering*, v. 24, Aug. 1952, p. 362-365.

Discusses difficulties encountered with the use of the bridge operated electromechanical pick-ups supplied with alternating current, particularly that of detecting or separating the modulation components. Graphs.

12845* A Stable, High Quality, Power Amplifier. E. J. Miller. *Electronic Engineering*, v. 24, Aug. 1952, p. 366-367.

Describes and illustrates problems encountered in design of the above. Graphs and circuit diagrams.

12846* The Design of Wire Wound Resistors. K. I. Selig. *Electronic Engineering*, v. 24, Aug. 1952, p. 372-373.

Design is based on the use of cylindrical formers. Resistors are designed to have a given power dissipation and required resistance. All quantities involved, together with their dimensions and representative symbols are tabulated.

12847 Industrial Magnetrons for Dielectric Heating. Richard B. Nelson. *Electronics*, v. 25, Aug. 1952, p. 104-109.

Magnetron oscillators, their control circuits, and industrial applications of the tubes are discussed. Includes photographs; also Rieke, equipment, and circuit diagrams.

12848 Half-Wave Magnetic Servo Amplifier. Carroll W. Lufcy, A. E. Schmid, and P. W. Barnhart. *Electronics*, v. 25, Aug. 1952, p. 124-125.

Possibilities in automatic feedback controls where reliability of operation and extreme ruggedness are important. Details of 60 and 400-cps. amplifiers.

12849 Electronic Analog Computer Fundamentals. Dewitt H. Pickens. *Electronics*, v. 25, Aug. 1952, p. 144-147.

Presents above for the non-expert.

12850 Data-Displaying Cathode-Ray Tube. Joseph T. McNaney. *Electronics*, v. 25, Aug. 1952, p. 174, 178, 182, 186.

Description and operation of above tube currently being developed for computer read-out applications. Numerals and other characters can be produced on the screen and can be transferred, for example, by xerography to paper. Photographs and schematic drawing.

12851 Two-Tube Square-Law Detector. David M. Goodman. *Electronics*, v. 25, Aug. 1952, p. 198, 202, 206, 210, 212.

Theory and description of above with a useful operating range of 9 volts peak-to-peak in the grid circuit of a 6AH6 vacuum tube. Graph and circuit diagram.

12852 Network Analysis by Least Power Theorems. Frederick L. Ryder. *Journal of the Franklin Institute*, v. 254, July 1952, p. 47-60.

Discusses electrical power theorems, analogous to certain structural theorems based on work of deformation, which permits solution of general linear networks without the use of Kirchhoff's second law, in the mesh-analysis case; and of Kirchhoff's first law, in the nodal-analysis case. The resulting procedures for network analysis are more direct than conventional methods in networks containing transformers.

12853 Factors Affecting the Design of an Automatic Electron-Trajectory Tracer. K. F. Snader, C. W. Oatley, and J. G. Yates. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 3, July 1952, p. 169-176; disc., p. 177-179.

Describes a new method of determining electron trajectories in an electrostatic field. Information derived from a model elect-

rode system in an electrolytic tank is passed automatically and continuously to a differential analyzer, where the equations of motion of the electron are integrated and its trajectory is traced on an output table. Results obtained with apparatus are described, and a detailed analysis of factors affecting overall accuracy included. Graphs and circuit diagrams.

12854* On the Current Induced in a Conducting Ribbon by the Incidence of a Plane Electromagnetic Wave. E. B. Moullin and F. M. Phillipp. *Proceedings of the Institution of Electrical Engineers,* v. 99, pt. 4, July 1952, p. 137-150.

The first 2 sections are devoted to extending the analysis of the above, developed by Morse and Rubenstein in terms of Mathieu functions, so as to make possible the calculation of the induced currents. The 3rd section is devoted to predicting the diffraction pattern from the currents induced in the ribbon and to discussing the effect which their distribution will have on the shape of the pattern. Numerous graphs.

12855* An Approximate Method for Deducing Dielectric Loss Factor From Direct-Current Measurements. B. V. Hamon. *Proceedings of the Institution of Electrical Engineers,* v. 99, pt. 4, July 1952, p. 151-155.

Above is developed for deducing the dielectric loss factor of a solid dielectric from the charging current that flows after the sudden application of a direct voltage. The range of application of the method is discussed, and its use in correlating d.c. measurements with a.c. bridge measurements on the same sample is illustrated by experimental results. Graphs. 16 ref.

12856* The Impedance of Unsymmetrical Strips in Rectangular Waveguides. L. Lewin. *Proceedings of the Institution of Electrical Engineers,* v. 99, pt. 4, July 1952, p. 168-176.

The radiation from capacitive and inductive strips is calculated in terms of arbitrary currents flowing on the strip surfaces. Generalizations of the well-known quasistatic formula for symmetrically located strips are presented.

12857* The Development of a Multi-Cathode Decade Gas-Tube Counter. G. H. Hough. *Proceedings of the Institution of Electrical Engineers,* pt. 4, v. 99, July 1952, p. 177-186.

After the introduction, which deals briefly with the speed limitations of the present type of cold-cathode gas-tube counter, the mechanism which produces a reduction in the breakdown voltage of a gap adjacent to a discharging gap is outlined. A simple type of multicathode tube is described and design features are treated in detail. A method of computing the d.c. tolerance range is given. In conclusion, a few very general remarks are made concerning application of the tube. Graphs, schematic drawings, circuit diagrams and photographs.

12858* Observations on the Electrical Breakdown of Gases at 2800 Mc/s. Part 2. Relative Breakdown Stresses, Statistical Lags and Formative Lags. W. A. Prowse and W. Jasinski. *Proceedings of the Institution of Electrical Engineers,* v. 99, pt. 4, July 1952, p. 194-203.

Gas confined in a nosed-in-cavity type of resonator is subjected to individual pulses of electric stress of 2800 mc./s. frequency, and variation of the field amplitude with statistical and formative time-lags preceding breakdown and with the relative breakdown stresses of various gases was determined. Graphs. 12 ref.

12859* The Solution of Waveguide and Cavity-Resonator Problems With the Resistance-Network Analogue. G. Liebmann. *Proceedings of the Institution of Electrical Engineers,* v. 99, pt. 4, July 1952, p. 260-272.

An experimental iteration process is described for solution of the above problems. Presents the basic mathematical relations required, and describes the apparatus and its mode of operation. Several examples are given of waveguides having various cross-sections and of cavity resonators with axial symmetry. Tables, graphs, and circuit diagrams. 12 ref.

12860* Experimental Verification of the Theory of Laminated Conductors. H. S. Black, C. O. Mallinckrodt, and S. P. Morgan, Jr. *Proceedings of the I.R.E.,* v. 40, Aug. 1952, p. 902-905.

An experimental coaxial line was constructed whose center conductor was laminated and whose phase velocity could be varied by changing the dielectric constant of the main dielectric. The attenuation was then measured and results discussed. A theoretical analysis of the experimental laminated conductor is described in the appendix. Diagrams.

12861* Standards on Gas-Filled Radiation Counter Tubes: Definitions of Terms, 1952. Methods of Testing, 1952. *Proceedings of the I.R.E.,* v. 40, Aug. 1952, p. 924-930.

12862* Miniature Rectifier Computing and Controlling Circuits. An Wang. *Proceedings of the I.R.E.,* v. 40, Aug. 1952, p. 931-936.

General types of rectifier computing circuits are described and analyzed. Stress is placed upon the realization of the highest speed of operation. Se-rectifier elements are used throughout, although the same analysis applies to all other types of rectifiers. Special techniques of circuit construction are developed which result in a simple, compact, and economical system, applicable not only to large-scale digital computing machines but also to complicated control systems. Numerous circuit diagrams.

12863* A Frequency Stabilization System for Microwave Gas Dielectric Measurements. William F. Gabriel. *Proceedings of the I.R.E.,* v. 40, Aug. 1952, p. 940-945.

A system is described for measuring the dielectric constant of a gas at uhf. by observing the shift in resonant frequency of a cavity when filled with the gas to be measured. Graphs and phase diagrams. 19 ref.

12864* A Broad-Band Interdigital Circuit for Use in Traveling-Wave-Type Amplifiers. R. C. Fletcher. *Proceedings of the I.R.E.,* v. 40, Aug. 1952, p. 951-958.

An anlaysis is presented which indicates that the above type of circuit can be arranged to give constant phase velocity over a wide bandwidth (30%), as required to give constant gain. The analysis is qualitatively checked experimentally. Numerous graphs.

12865* Network Synthesis by the Use of Potential Analogs. R. E. Scott. *Proceedings of the I.R.E.,* v. 40, Aug. 1952, p. 970-973.

2 analog devices are described which are useful in solving the approximation problem of network synthesis. Both devices utilize a sheet of conducting Teledeltos paper to produce a two-dimensional potential field which simulates a required network function. Diagrams, graphs, and photographs. 19 ref.

12866 The Initial Conduction Interval in High Speed Thyratrons. James B. Woodford, Jr. and Everard M. Williams. *Journal of Applied Physics,* v. 23, July 1952, p. 722-724.

Above is shown to be dependent on two parameters. The first of these is dependent on tube construction and the second on circuit elements. It is shown that both factors are significant in operation of hydrogen thyratrons in millimicrosecond switching service.

12867 Theory of Wave-Guide-Fed Slots Radiating Into Parallel-Plate Regions. Harry Gruenberg. *Journal of Applied Physics,* v. 23, July 1952, p. 733-737.

A theoretical expression is derived for conductance of a longitudinal shunt-slot in a rectangular guide when the slot is radiating into a parallel-plate region of arbitrary plate spacing. Some peculiarities of the theoretical results are discussed.

12868 The Admittance of a Diode With a Retarding Field. J. J. Freeman. *Journal of Applied Physics,* v. 23, July 1952, p. 743-745.

Contribution of space charge to the admittance of a diode with a retarding field is calculated by computing instantaneous current induced in an external circuit. A discussion of variation of susceptance of a typical diode with frequency is given.

12869 The Use of Radioactive Isotopes in a Study of Evaporation From Thermionic Cathodes. W. F. Leverton and W. G. Shepherd. *Journal of Applied Physics,* v. 23, July 1952, p. 787-793.

Radioactive tracers were used in a study of evaporation of the alkaline earths, Ba, Sr, and Ca from oxide coatings on passive Ni bases. 10 ref.

33. *Electricity and Electronics*

12870 The Elimination of Errors Due to Stray Capacitances in Certain Schering Bridge Measurements. H. C. Hall. *Journal of Scientific Instruments*, v. 29, July 1952, p. 224-225.

Describes simple method involving only one switching operation. The test specimen may remain connected to the circuit throughout. Circuit diagrams.

12871 A Differential-Voltmeter Using a Temperature-Limited Diode. V. H. Attree. *Journal of Scientific Instruments*, v. 29, July 1952, p. 226-229.

A temperautre-limited diode in a bridge circuit is used to measure true r.m.s. voltage. Long-term stability is to ±0.2% of the nominal voltage and short-term variations of 0.1% may be detected. A typical instrument for 230v. lines has a range of 215-245v. and consumes 10 watts. Circuit diagram. 19 ref.

12872* Two New Photomultipliers for Scintillation Counting. M. H. Greenblatt, M. W. Green, P. W. Davison, and G. A. Morton. *Nucleonics*, v. 10, Aug. 1952, p. 44-47.

The type H-5037 tube is designed for efficient collection of light from a large crystal, and the type 4646, for counting events involving extremely short time intervals. Their design and applications are discussed.

12873* On the Scattering Matrix of Symmetrical Waveguide Junctions. A. E. Pannenborg. *Philips Research Reports*, v. 7, June 1952, p. 169-188.

Outline of Kerns' theory on the above in conjunction with some aspects elaborated by Dicke. Assumes the reader is acquainted with the fundamental results of the theory of finite groups. (To be continued.)

12874* Thermionic Emitters Under Pulsed Operation. R. Loosjes, H. J. Vink, and C. G. J. Jansen. *Philips Technical Review*, v. 13, June 1952, p. 337-345.

Describes and discusses the above phenomenon. Diagrams, graphs, and electron-velocity spectrograms. 10 ref.

12875* Dielectric Losses in Glass. J. M. Stevels. *Philips Technical Review*, v. 13, June 1952, p. 360-370.

Discusses the behavior of glass in an electric alternating field and the role of dielectric losses as a factor in this behavior pattern. Numerous graphs.

12876 A Theory of Contact Noise. Richard L. Petritz. *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 535-536.

Proposes theory that temperature fluctuations in the "neighborhood" of the contact are the source of contact noise. Graphs.

12877* Power Rectifiers: Many Types Join Mercury-Arc to Meet Expanding Needs. *Power*, v. 96, Aug. 1952, p. 84-87.

Various types are described, diagrammed, and discussed.

12878 Characteristics of Nickel-Cadmium Batteries Produced by Power Metallurgy. C. Berg. *Precision Metal Molding*, v. 10, Aug. 1952, p. 49-50, 83-84.

Pocket-type Ni-Cd cells produced at Easthampton, Mass. Plant of Nickel Cadmium Battery Corp. use sintered carbonyl-Ni plates. Method of porduction and advantages, especially greater porosity.

12879 Power and Voltage Amplifiers. R. B. Immel. *Product Engineering*, v. 23, Aug. 1952, p. 178-179.

Shows fundamental electronic circuits and brief remarks concerning 5 basic types.

12880* Industrial Applications of Semi-Conductors. 5. Crystal Valves. A. Lindell and G. M. Wells. *Research*, v. 5, July 1952, p. 317-323.

A discussion of crystal-tube rectifiers. Briefly considers their development from early days to the present and points out possible future uses. Treats the following in some detail: point-contact rectifiers, point-contact triodes, junction-type diodes, and junction-type triodes. Circuit diagrams and graphs.

12881* Industrial Applications of Semi-Conductors. 6. Oxide Cathodes. S. Wagener, *Research*, v. 5, Aug. 1952, p. 355-362.

Oxide cathodes consist of a metal core which carries a semiconducting coating of alkaline earth oxides. With most cathodes used in practice, a second semiconductor, called the "interface layer", is formed between two basic constituents due to a chemical reaction. Properties of the semiconducting coating are reviewed and present performance levels as observed in modern electronic tubes are quoted. Structures of the interface semiconductor and some of the factors influencing their formation are discussed. The influence of interface resistance on performance of oxide cathodes and growth of this resistance during life are dealt with briefly. 34 ref.

12882 On the Diffusion Theory of Rectification. P. T. Landsberg. *Proceedings of the Royal Society*, ser. A, v. 213, June 24, 1952, p. 226-237.

Suggests a method of analyzing d.c.-voltage curves of contact rectifiers by a uniform method which is based on both forward and reverse characteristics. Table and graphs. 30 ref.

12883* Microwaves. J. R. Pierce. *Scientific American*, v. 187, Aug. 1952, p. 43-51.

A description for the layman of theory and application of the above. Typical microwave equipment is illustrated and discussed.

12884 Boroncarbon Resistor Characteristics. George Kende. *Tele-Tech*, v. 11, Aug. 1952, p. 48-49, 75.

Describes development of ½-watt units suitable for mass production and having extremely stable characteristics. Properties are charted.

12885 Activation of High Vacuum Oxide-Cathode Valves. G. H. Metson. *Vacuum*, v. 1, Oct. 1951, p. 283-293.

Discusses various aspects of the above. The 3 current theories of activation—chemical reduction, electrolysis, and thermodynamic—are considered and discussed on the basis of the author's experiences.

12886* Design of Cylindrical Resonators as High "Q" Wavemeters. H. E. Stinehelfer, Sr. *Western Union Technical Review*, v. 6, July 1952, p. 85-91.

Describes design for maximum "Q" required, with regard for frequency, bandwidth, and physical-size limitations. Numerous graphs, tables, and oscillograms.

12887* Wave Filter Characteristics by a Direct Method. R. C. Taylor and C. U. Watts. *Western Union Technical Review*, v. 6, July 1952, p. 102-110.

Describes the above method in detail, giving much pertinent data in graphs and tables.

12888* Slow-Speed Circular Time-Base. A. M. Hardie and P. A. V. Thomas. *Wireless Engineer*, v. 29, July 1952, p. 177-183.

Discusses methods of displaying signals on the cathode-ray tube in polar form, so that the phenomenon to be examined appears in correct phase relation with reference to a rotating number. In relation to this, describes development of an improved sine-cosine potentiometer. Circuit and other diagrams, and photographs.

12889* Multiple Reflections in Long Feeders. L. Lewin. *Wireless Engineer*, v. 29, July 1952, p. 189-193.

Signal distortion produced by reflections at many points along a mismatched feeder is analysed in terms of harmonic distortion, for a single-tone signal, and in terms of interchannel interference in the case of a multichannel source. Graphs.

12890 Fiberglas Yarns—Their Qualities and Applications. Paul L. Layton. *Wire and Wire Products*, v. 27, Aug. 1952, p. 776-778.

Illustrated summary of characteristics and uses of glass yarns in the manufacture of electric wire and cable.

12891* Electrical Measuring Technique. (German.) W. Hunsinger. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, July 1, 1952, p. 619-626.

New electrical instruments for measuring voltages, frequencies,

resistances, insulating properties, voltage, sound, and high frequencies are described and illustrated. 147 ref.

Miscellaneous Publications

12892 A Transient Approach to the Solution of a Linear Servomechanism by an Equivalent Network. S. P. Tung. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 7-13. (TK161 N21p.)

12893 Stabilization of Variable Carrier Frequency Servomechanisms. Karl Schurr. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 14-23. (TK161 N21p.)

Treats specifically the problem of maintaining a narrow notch which will produce the desired rate signal even though carrier frequency shifts over a considerable range. Shifting of the notch is accomplished by a secondary or auxiliary servo loop consisting of a frequency detection network, amplifier, and servo motor.

12894 Design of Damper-Stabilized Instrument Servomechanisms. J. Frank Koenig. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 24-28. (TK161 N21p.)

A new method is applied to the above. It is compared with the Nyquist diagram method. It can be called the root trajectory method and applies to equations or systems of all orders. 17 ref.

12895 Frequency Control of Modulated Magnetrons by Resonant Injection System. L. L. Koros. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 39-45. (TK161 N21p.)

Tells how output frequency may be stabilized with a crystal controlled r.f. voltage. The magnetron output carrier can be 100% amplitude modulated with higher fidelity.

12896 Analysis of Modulated Electron Beams. W. W. Cannon and L. E. Bloom. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 59-63. (TK161 N21p.)

A device for analyzing a beam into its components of velocity and density is described. It may be used for analyzing beams from klystrons or traveling-wave tubes and the space charge in magnetrons.

12897 A High-Voltage Electron-Trap Rectifier. E. G. Linder, J. H. Coleman, and E. G. Apgar. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 64-72. (TK161 N21p.)

A new cold-cathode high-voltage rectifier is described. Operation is based upon an improved type of electron trapping similiar to that occurring in a cylindrical magnetron in the cut-off condition, but augmented due to the use of end plates on the cathode.

12898 High-Q Low-Frequency Resonant Filters. J. S. Brown and W. Thayer, Jr. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 92-96. (TK161 N21p.)

Two low-frequency (30-cycle) resonant circuits depending on positive feedback for their high Q (higher than 1000) are described. It is shown that these circuits have frequency characteristics quite similar to the RLC resonant circuit. Sample curves are shown for variation of Q over an 8-hr. period.

12899 Synchronous Detection of Amplitude-Modulated Signals. John P. Costas. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 121-129. (TK161 N21p.)

Calculations, graphs, and circuit diagrams. 13 ref.

12900 Input Versus Output Signal-to-Noise Characteristics of Linear, Parabolic, and Semi-Cubical Detectors. Allen H. Schooley and Samuel F. George. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 151-161. (TK161 N21p.)

Theoretical and experimental curves are presented. Experimentally determined signal-to-noise ratio data for a semi-cubical detector are given to show the effect of amplitude clipping in detector operation when noise is present.

12901 A Sweep Frequency Method of Q Measurement for Single-Ended Resonators. E. D. Reed. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 161-172. (TK161 N21p.)

A method is described in which oscillographic display of reflected power as a function of frequency is used to obtain values of internal and external Q of a cavity resonator.

12902 A Precise Electronic Function Generator. C. N. Pederson, A. A. Gerlach, and R. E. Zenner. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 216-227. (TK161 N21p.)

The instrument described is an electro-optical system designed as a function generator for use with commercially available electronic analog computers. Its main features are high accuracy, rapid response, and ease of function specimen preparation.

12903 Basic Operating Principles of Magnetic Amplifiers. E. V. Weir. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 235-240. (TK161 N21p.)

An analogy is drawn between the magnetic amplifier and the conventional vacuum-tube amplifier, the former being explained as inductive impedance control and the latter as resistive impedance control. Fundamentals of operation of the magnetic amplifier are discussed. Shows how the "firing point" on the operating half cycle is predetermined through establishment of certain flux levels in the core during the preceding half cycle. Dependence upon characteristics of the magnetic material, rectifiers, and control currents is explained; some basic limitations on power gain, linearity, stability, and speed of response are discussed.

12904 Voltage Regulator With Magnetic Amplifiers for Large Alternators. H. F. Storm. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 247-253. (TK161 N21p.)

Circuit diagrams, graphs, and illustrations.

12905 Low Input-Power Level Magnetic Amplifiers. Lester W. Buechler. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 254-259. (TK161 N21p.)

In order to require a minimum of control power, self saturation, low-reistance control winding, a push-pull circuit connection, and stable rectifiers are used. It has been possible to build amplifers which can be used down to one millimicrowatt and as low as one micromicrowatt on experimental amplifiers.

12906 Graphical Analysis for Circuits Containing Overdriven Vacuum Tubes. Robert J. Parent. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 263-274. (TK161 N21p.)

12907 The Effect of Noise on the Frequency Stability of a Linear Oscillator. Robert M. Lerner. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 275-286. (TK161 N21p).

Instabilities are discussed quantitatively for oscillators in which all elements are linear except for some slow-acting amplitude control. It is shown that the bandwidth of the noisy oscillation can be predicted from easily measured system characteristics. Several methods of defining frequency of the output are considered with special reference to precision measurements. Numerical estimates of these effects are made, and ways of minimizing them are suggested.

12908 Narrow-Band Spectrum Analysis of a Pulse-Position-Modulated Signal. Laurance H. Lloyd. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 291-298. (TK161 N21p.)

An investigation was made of the capabilities and limitations of the sound spectrograph for obtaining relative frequency and position data from electronic signals consisting of pairs of short pulses. Effects of bandwidth, group prf., pulse separation, noise, and other factors were investigated.

12909 Some Recent Developments in Traveling-Wave Tubes for Communication Purposes. J. H. Bryant, T. J. Marchese, and H. W. Cole. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 299-303. (TK161 N21p.)

12910 An Analogue Electronic Correlator. J. Francis Reintjes. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 390-400. (TK161 N21p)

An electronic device for evaluating correlation functions is described. The machine is capable of providing 110 points on the correlation curve of signals having frequency components in the range between 500 cycles and 100 kc. per sec. Operation

83. *Electricity and Electronics*

is based upon the principle of discrete sampling of the input signal, in pairs, at periodic intervals. Includes discussion of principles of operation, details of circuitry, and examples of experimental data.

12911 Response of a Linear Network to an Input With Linearly Variable Frequency as Obtained in Sweep Frequency Testing. H. Ekstein and T. Schiffman. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 454-471. (TK161 N21p)

12912 The Motion of a Taut Ribbon Deflected Electrostatically. Eugene W. Pike. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 472-474. (TK161 N21p)

Detailed theoretical studies indicate that an electrostatically-operated relay offers many advantages over conventional magnetic relays for some services. The principal advantages are: operating time as short as 50 microsec., size and weight equivalent to a subminiature tube, operation on d.c. or any a.c. frequency to 1000 mc., extremely rugged, operating impedance equivalent to a capacitance of 10 mmfd. and low cost. The primary disadvantage is low power handling capacity of the contacts.

12913 Rules of Similitude for Magnetic Amplifier Systems. L. A. Finzi and H. L. Durand. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 498-514. (TK161 N21p)

The study yields a tool for design purposes and supplies a basis for rational classification and comparison of seemingly different amplifier-circuit arrangements.

12914 A Magnetic Amplifier of High Input Impedance. George M. Ettinger. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 523-528. (TK161 N21p)

A magnetic modulator having a noise level of less than 10^{-14} watts is described. This modulator employs high permeability cores in a cathode-follower circuit to raise the input impedance of the system to several megohms. Tests for transient distortion are described in some detail.

12915 Use of the Flux-Charge Concept in Magnetic Amplifier Analysis. Paul M. Kintner. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 529-536. (TK161 N21p)

12916 New Developments in the Auto-Sembly Technique of Circuit Fabrication. S. F. Danko. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 542-550. (TK161 N21p)

The auto-sembly technique of circuit fabrication is based on use of prefabricated conductor patterns of copper on an insulating plastic base, conventional components, and solder dip assembly of components to pattern. Reviews various applications of these techniques including rf. amplifiers, mixers, if. amplifier strips, discriminators, audio amplifiers, tunable inductors, heaters, switches, long-line oscillators, etc. Copper-faced laminate materials are suited for any temperature up to 200°C. Patterns of aluminum, iron, bronze, and silver can also be prepared for special applications. Variations in the technique of solder-dipping in the preparation of embossed, sub-surfaced, and flush patterns, and in packaging of auto-sembled patterns are discussed.

12917 Techniques in the Measurement of Several Components. Isidore Bady. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 551-560. (TK161 N21p)

A method is described in which changes in capacitance due to temperature changes of a large number of capacitors can be measured accurate to 0.01 $\mu\mu$f. Accuracy can be increased to 0.001 $\mu\mu$f. by using a novel sample holder. A technique to measure temperature coefficients automatically is described. Also describes a test set to measure transmission unbalance of rf. cable.

12918 High Temperature Operation of Metallized-Paper Capacitors. Louis Kahn. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 561-567. (TK161 N21p)

Use of metallized-paper capacitors at temperatures in excess of 65°C. has been limited by a number of factors. An analysis of these factors, and reasons for the rapid derating of the capacitor with increase in temperature, indicated that decrease in viscosity of the impregnating medium, its deterioration in viscosity of the impregnating meduim, its deterioration in the vicinity of a point of failure and self clearing, and decreased dielectric strength of the paper at elevated temperautres were responsible. Study of the ideal characteristics for an impregnant indicated that a solid dielectric would have characteristics superior to either a wax or an oil. Aerolene, a polyester impregnant, was found to be highly suitable for this application. 15 ref.

12919 An Ionized Gas Energy Detector for Microwaves. Howard Burroughs and Arthur B. Bronwell. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 598-600. (TK161 N21p)

Absorption of microwave energy by a gas was found to serve as an efficient detector of modulated microwave signals. When used in a waveguide, this detector operates independently of the waveguide mode. This detector might prove of advantage for the detection of extremely short wavelength signals in waveguides.

12920 Electromagnetic Propagation in Two-Dielectric-Layered Parallel-Plane Waveguides. J. Van Bladel and T. J. Higgins. *Proceedings of the National Electronics Conference*, v. 7, 1951, p. 601-607. (TK161 N21p)

Equations for modes and eigenvalues of 2-dielectric-layered, infinitely-wide, parallel-plane waveguides are derived for 3 configurations of dielectric arrangement. From these equations, graphs are plotted of cut-off frequency over a range of geometric and dielectric parameters characterizing essential features of operation of the guides.

12921 A Basic Amplifier for Electronic Instrumentation. Andrew B. Jacobsen. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 2, 1952, p. 43-50. (TG265 So13p)

Circuit diagrams and illustrations.

Books

12922 Electrical Engineering. Theory and Practice. William H. Erickson and Nelson H. Bryant. 523 pages. 1952. John Wiley & Sons, New York. (TK165 Er44e)

Developed from mimeographed material used as a text for non-electrical engineering students. Covers 3 general categories—circuits, machines, and electronics. Stresses factors that influence intelligent application or selection of equipment. Problems at ends of chapters.

12923 Electric Machinery; An Integrated Treatment of A-C and D-C Machines. Ed. I. A. E. Fitzgerald and Charles Kingsley, Jr. 702 pages. 1952. McGraw-Hill, New York. (TK2000 F57e)

Intended for undegraduate machinery courses in electrical engineering. Presents theory in a manner which highlights the basic principles common to all rotating electric machines, as well as to a wide variety of electromechanical-energy-conversion devices. This basic theory is then applied to d.c., synchronous, polyphase induction, and single-phase machines, together with Amplidynes, Rototrols, and Selsyns. Transformers are included because of the many similarities in thought processes involved in their study. Ends with introductions to machine transients and to the dynamics of electromechanical systems. Problems follow each chapter.

12924 Introduction to Electrical Engineering. Ed. 2. Robert Page Ward. 412 pages. 1952. Prentice-Hall, New York. (TK145 W22i2)

In this edition of the text (originally written for sophomore students concurrently taking first courses in calculus and physics), discussion of certain topics has been amplified. An attempt has been made to clarify further the matter of voltage notation and to improve the manner of stating the definitions of electric and magnetic field intensity and flux density. About 250 additional questions and problems have been included. Diagrams.

12925 Les Tubes Électroniques a Commande par Modulation de Vitesse. (Electronic Tubes Employing Velocity

Modulation.) (French.) R. Warnecke and P. Guénard. 792 pages. 1951. Gauthier-Villars, Imprimeur-Editeur, Paris. (QC-544.V3 W24t)

Discusses the above very extensively with respect to high-frequency electric circuits, electronic phenomena, theory of the principal types of tubes, experimental results, and technical problems by use of the tubes.

See also:
12118 (signal-shaping circuits)
12149 (calibration of photomultiplier tubes)
12181 (photoformer design and perfomance)
12186 (magnetic amplifier for position-indicating servo)
12738 (electrical applications of Mn-Zn ferrites)

34. GRAPHIC ARTS

12926* Alloy Plate Mounts. John Stephenson. *British Printer*, v. 65, July-Aug. 1952, p. 60-61, 66.

Describes a printing plate mount having a honeycomb duraluminum base. Advantages are discussed. Illustrated.

12927* The Absorption of Bichromate in the Sensitization of Pigment Paper. (German.) Hans de Goeij. *Fachhefte*, June 1952, p. 124-130.

Tables and graphs show the rate of dichromate absorption under variable conditions of both concentration, time, and moisture content of the gelatin. (Battelle translation available.)

12928* Better Quality Lower Costs Through Research. William M. Winship. *National Lithographer*, v. 59, July 1952, p. 42-43, 60-61, 81.

Brief review of research and technical developments which have contributed to improved quality, quality control, increased production, greater uniformity and lowered costs in printing.

12929* Studies in the Resolving Power of Photographic Emulsions. IV. The Effect of Development Time and Developer Composition. V. The Effects of Reduction and Intensification. Fred H. Perrin and J. H. Altman. *Journal of the Optical Society of America*, v. 42, July 1952, p. 455-467.

Part IV describes the above, while Part V is an investigation of the effects of 6 common reducers and 4 common intensifers studied on a high-contrast positive emulsion, a fine-grained panchromatic negative emulsion, and a high-speed negative emulsion. Numerous graphs and tables. 37 ref.

12930* Investigations of the Exposure Scales of Characteristic Curves of Photographic Emulsion Layers. A. P. H. Trivelli. *Journal of the Optical Society of America*, v. 42, July 1952, p. 467-474.

The application of a quantum theory of photographic exposure to photographic films of extended exposure latitude was studied. The applicability of binary functions, as well as functions based on variable intrinsic sensitivity or quantic sensitivity of the emulsions, was examined for a number of exemplary films. Some experiments on effects of supersensitizing-optical sensitizing combinations were made. Numerous graphs. 13 ref.

12931* Henry Appraises Phototypesetting. Thos. P. Henry. *Printing Equipment Engineer*, v. 82, Aug. 1952, p. 44-47.

Based on 20 mos. experience with an Intertype Fotosetter. Briefly considers other machines.

12932* Principles of Huebner Phototypesetting Equipments Discussed. Wm. C. Huebner. *Printing Equipment Engineer*, v. 82, Aug. 1952, p. 47-48.

12933* The Ansco Color Negative-Positive Process. Herman H. Duerr. *Journal of the Society of Motion Picture and Television Engineers*, v. 58, June 1952, p. 465-479.

Basic principles of the above process are outlined. Deals with essential characteristics of the color-film materials used, and outlines the printing and processing steps required. Methods used to comply with requirements of the motion-picture industry are described. 13 ref.

12934* Nonsilver Photographic Processes. Thomas T. Hill. *Journal of the Society of Motion Picture and Television Engineers*, v. 59, July 1952, p. 58-65; disc.; p. 65-66.

A number of nonsilver photographic, or light-sensitive systems such as those based on diazo dyes, have been used or proposed for specialized purposes. None of them, as yet, exhibits the sensitivity or the wide applicability of the silver process. Surveys current status of these systems with particular reference to the field of motion-picture engineering. 25 ref .

See also:
12816 (military photography)

35. STATISTICS AND ECONOMICS

12935 Aluminium Limited: Little Brother Grows Up. *Business Week*, July 26, 1952, p. 82-84, 86-88, 90.

Deals with the economic status of Al in Canada, stressing the position and importance of Aluminium Limited of Montreal.

12936* Sources of Sulphur in Canada. T. H. Janes. *Canadian Mining and Metallurgical Bulletin*, v. 45, July 1952, p. 422-428.

Economic survey. Tables. 12 ref.

12937 The Outlook for Key Commodities. *Chemical and Engineering News*, July 21, 1952, p. 2983-2986.

3rd of 4 articles based on reports of the President's Materials Policy Commission. Discusses ferrous and nonferrous metals, miscellaneous strategic materials and nonminerals.

12938 The Outlook for Chemicals. *Chemical and Engineering News*, v. 30, Aug. 11, 1952, p. 3257-3261.

As a conclusion to its 4-part report on the highlights of the President's Materials Policy Commission study, *C.&E.N.*, the many discussions on chemicals appearing throughout the 5-vol. work are summarized.

12939 Phosphorus: Shifting, Growing, Changing. Joseph Gordon. *Chemical Week*, v. 71, Aug. 2, 1952, p. 26-28, 30, 33-34, 36, 38, 40, 42.

An economic survey with information on such topics as new production furnaces, existing elemental producers and capacities, raw materials, finished products such as agricultural chemicals, and outlook. Charts.

12940 Satellite Europe's Mineral Position. John M. Warde. *Engineering and Mining Journal*, v. 153, Aug. 1952, p. 84-89.

Discusses mineral production in the Russian satellite countries of Europe: East Germany, East Austria, Poland, Czechoslovakia, Romania, Bulgaria, and Albania. Includes map of mineral deposits and iron and steel centers.

12941 Can the U. S. Use Its Low-Grade Domestic Chrome Ore? H. A. Doerner. *Engineering and Mining Journal*, v. 153, Aug. 1952, p. 90-92.

Discusses above question. Surveys U. S. Cr resources. Methods of upgrading are discussed. Also raises the question of whether upgrading is necessary. In this connection, an abstract of a report by D. H. Ruhnke of Republic Steel Corp. is presented. This indicates that lower grade ferrochromium may be satisfactory for steelmaking.

12942* The Boom That Made Canada. Gilbert Burck. *Fortune*, v. 46, Aug. 1952, p. 91-95, 172, 174, 176-178, 181-183.

An illustrated economic survey.

12943 The Crisis in Raw Materials. *Fortune*, v. 46, Aug. 1952, p. 114-117, 160, 163-164, 166-168, 170.

Condensed from a 5-volume report by the President's Materials Policy Commission.

12944* United States Trade in Ores and Metals. *Metal Age*, July 1952, p. 3-10.

Text and tables.

12945 India Ups Manganese Production to Supply "Free World" Market. *Mining World*, v. 14, Aug. 1952, p. 34-37.

Discusses the economic status and supply of Mn in India. Considers the geology of the deposits, geographical distribution,

35. *Statistics and Economics*

grades of ore, prospecting and mining, beneficiation and marketing, and export. Tables, photographs, and map.

12946 Oil in the Booming Northwest. Frank Breese. *National Petroleum News*, v. 44, Aug. 13, 1952, p. 56-57, 59-62, 64-65.

Economic survey. Tables and map.

12947 Future Market for Aromatics. *Petroleum Processing*, v. 7, Aug. 1952, p. 1154-1158, 1160.

Ebasco study of Bureau's synthetic-fuel cost estimates forecasts 1955 demand for chemical co-products. Tables, graphs, and map showing principal market areas for aromatics. 10 ref.

12948* The Italian Aluminum Industry. Part One. Minerals. Part Two. The Metal. (French.) G. A. Baudart. *Revue de l'Aluminium*, v. 29, May 1952, p. 171-173; June 1952, p. 217-219.

Includes map and production data.

12949 Petroleum Products: There'll Be Enough if We Expand All Facilities in Proportion. *SAE Journal*, v. 60, Aug. 1952, p. 17-24. (Excerpts from "Future Outlook for Petroleum Products", by C. E. Davis.)

Discusses worldwide situation.

12950* Antimony Deposits of Tuscany. G. Dessau. *Economic Geology and the Bulletin of the Society of Economic Geologists*, v. 47, June-July, 1952, p. 397-413.

Three deposits, Poggio Fuoco, Tafone, and Montauto are described in detail; others are covered more briefly. Tables and maps.

Books

12951 Sources of Iron Ore in Asia. Joseph F. Harrington and Benjamin M. Page. 176 pages. 1952. U. S. Dept. of Commerce, Office of Technical Services, Washington. (Report 154, Natural Resources Division, Economic and Scientific Section, General Headquarters, Supreme Commander for the Allied Powers, Tokyo.) (TN21 Un3re)

Presents a regional picture of the known, important iron ore deposits in East Asia. Data confined to the most essential factors necessary to determine the importance and place of a deposit in the regional economic pattern. Quantity and quality of ore, geology, mining methods, metallurgy, transportation, and history stated when information available. Maps, charts, and tables.

12952 Woolen and Worsted Manufacturing in the Southern Piedmont. James A Morris. 197 page. 1952. University of South Carolina Press, Columbia. (TS1615 M83w)

Analyzes the woolen and worsted industry, with particular reference to its southern segment. In particular, analysis of the status of the industry in the Piedmont, factors leading to expansion in this area and effects of the development of wool manufacturing are considered. Includes a brief history of the industry in America and development of the manufacturing process itself. Tables and bibliography.

12953 United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. IV. Water Resources. 466 pages, 1951. Department of Economic Affairs, United Nations, New York. (HC13 Un3p)

Contents: appraisal of water resources; water-supply and pollution problems; river-basin development; drainage-basin management; water-control structures; flood-control and navigation; irrigation and drainage; and hydro power and other water uses.

See also:
12401 (economic trends in chemical-process industries)

36. MISCELLANEOUS

12954 Special Report on AMC. *Aviation Week*, v. 57, Aug. 4, 1952.

Almost the entire isue is devoted to Air Material Command and Wright-Patterson Air Force Base, said to be the world's largest business. Gives comprehensive details of organization and activities, especially for the contractor who wishes to obtain Air Force business.

12955 Mathematics in Industry. J. Clarence Bell. *Battelle Technical Review*, v. 1, July 1952, p. 72-76.

Provides a look for the nonmathematician into the many ways in which mathematics may be applied to the solution of problems encountered in research and industry. First, attempts to define mathematics. Then outlines some familiar mathematics such as home-financing amortization schedules. Proceeds to the cases of heat conductions, aerodynamics and stress analysis, neutron-diffusion calculations, mathematical statistics, and communication theory. 16 ref.

12956 Review of Iron and Steel Literature for 1951. V. S. Polansky. *Blast Furnace and Steel Plant*, v. 40, July 1952, p. 793-800.

35th annual review list. Concerned only with separately published books and pamphlets. (To be continued.)

12957 The Promise of Technology. *Chemical and Engineering News*, v. 30, July 28, 1952, p. 3085-3088.

Concluding report on the President's Materials Policy Commission. The importance of technological growth is pointed out.

12958 Extinguishing Magnesium Fires With Boron Trichloride. *Foundry*, v. 80, Aug. 1952, p. 257-259.

Boron trichloride was found to be effective in extinguishing magnesium fires in heat treating, preheating and annealing furnaces. It is convenient to use because it vaporizes readily and is therefore easily applied. Discusses the chemical reaction involved which makes it a good extinguisher.

12959* How Atomic Radiation Affects Engineering Materials. D. O. Lesser. *Materials & Methods*, v. 36, July 1952, p. 75-78.

Discusses need for consideration not only of conventional properties but also atomic-radiation affects when choosing engineering materials for equipment in atomic power plants and reactors. Covers simplified theory, experimental techniques, reactor problems, and effects on oils, elastomers, ceramics, plastics, and metals. Illustrated.

12960 Ion Exchange—A New Technique for Metallurgists. Bernard Ostrof and Ernest E. Thum. *Metal Progress*, v. 62, July 1952, p. 67-74.

Discusses ion exchange in general and describes following applications; purification of H_2O and Cr electroplating solutions; recovery of Fe, Cr, Mn, Cu, Zn, and acid from pickling liquors; separation of rare earths; and purification of Zr from Hf. Diagrams and photographs.

12961 A New Research and Engineering Laboratory. R. W. Schlumpf. *Metal Progress*, v. 62, July 1952, p. 79-83.

Describes and illustrates above laboratory, Hughes Tool Co., Houston, Tex.

12962 Metallurgical Activities at Frankford Arsenal. Daniel J. Murphy. *Metal Progress*, v. 62, Aug. 1952, p. 67-72.

Facilities and research programs. Illustrated.

12963 Westinghouse Electric Correlates Its Product Development With Research. John Parina, Jr. *Metal Progress*, v. 62, Aug. 1952, p. 73-78.

Surveys the above, giving a brief summary of some of the more important accomplishments.

12964* The Impact of Guided Missiles on Ground Warfare. Nels A. Parson, Jr. *Military Review*, v. 32, Aug. 1952, p. 16-22.

12965 Water and Industry. Clyde Williams. *Monthly Business Review* (Federal Reserve Bank of Cleveland), v. 34, Aug. 1952, p. 12.

Discusses the importance of good water supplies for continued industrial development. Water supply has become more critical in recent years. Shortages have occurred in various parts of the country where the supply had previously been taken for granted. This has caused leaders in industry and government to re-examine present water-use practices and to study the potentials for increasing water supply and for making it

more reliable. Immediate and long-term means of improving the situation are discussed, including pollution abatement and increased re-use of water.

12966* AEC Work. Who's Doing It? What Does It Cost? *Nucleonics*, v. 10, July 1952, p. 59-64.

As collected here, the answers to these questions give a picture of the principal work undertaken by industrial contractors for the Atomic Energy Commission. Most of the data presented have not been published previously. Includes "cost-plus-fixed-fee" contracts that were active as of July 1, 1951, plus subsequent awards through Jan. 31, 1952. List is divided among contruction, architect-engineer, operation, and research and development projects.

12967* Radiation Tolerances and Genetic Effects. Harold H. Plough. *Nucleonics*, v. 10, Aug. 1952, p. 16-20.

A review of available information. Graphs. 39 ref.

12968* Air Force Armament Center Developing Weapons Systems for Modern Aerial Combat. E. P. Mechling. *Ordnance*,, v. 37, July-Aug. 1952, p. 163-165.

Facilities of Eglin Air Force Base, Florida.

12969* High-Speed Steels. (French.) Claude Vouga. *Revue de Métallurgie*, v. 49, June 1952, p. 393-407.

Discusses the history of above, their structure and application, and general metallurgical aspects. Tables give standard compositions. Micrographs. 20 ref.

12970 Metallurgical Techniques Applied to Archaeology. (French.) Albert France-Lanord. *Revue de Métallurgie*, v. 49, June 1952, p. 411-422.

Includes sections on fabrication of ancient swords and on corrosion and conservation of ancient bronzes. Numerous illustrations. 18 ref.

12971 Methodology Conference of the Central Statistical Administration, USSR. *Scientific Monthly*, v. 55, Aug. 1952, p. 71-78. (Translated from *Vestnik Statistiki*, v. 1, 1950, p. 88-94.)

Based on this report, the conference was largely devoted to condemnation of "bourgeois distortion which has penetrated textbooks and programs on statistics." Condemns the "universal theory of statistics and the divorcing of scientific work on statistics from the practical tasks of socialist construction."

12972* Practical Problems of Steel for Sheet and Strip. (German.) Erich Schauff. *Stahl und Eisen*, v. 72, July 17, 1952, p. 892-898.

Discusses requirements of thickness uniformity, surface finish, and deformability of sheets required by the metal-working industries; effects of composition; statistical analyses of essential elements, oxides, and other nonmetallic inclusions in the steel; and killed vs. rimming steel. Tables, graphs, and photomacrographs.

12973 Outside Facilities Extend Scope of Industry Research. Benjamin Melnitsky. *Steel*, v. 131, Aug. 4, 1952, p. 96-98.

Tells how basic and applied research problems of many companies are being solved by universities, trade associations, and government agencies. Summary list outlines sources.

Books

12974 Dinamicheskaia Meteorologiia. (Dynamic Meteorology.) V. A. Belinskii. 703 pages. 1948. Government Publishing House for Technical-Theoretical Literature, Moscow and Leningrad, U.S.S.R. (QC880 B41d)

Intended as a textbook. The fields covered include thermodynamics of gases and air, statics of the atmosphere, heat radiation, hydromechanics, atmospheric properties influencing weather, and methods of weather forecasting.

12975 Alcoa: An American Enterprise. Charles C. Carr. 292 pages. 1952. Rinehart & Co., New York (HD9539 A6 C23a)

Relates the story of the first 62 yrs. of existence of the Aluminium Co. of America.

12976 The Exploration of Space. Arthur C. Clarke. 199 pages. 1951. Harper & Brothers, New York. (TL789 C55e)

Nontechnical but accurate account of the science of "astronautics"—by the chairman of the British Interplanetary Society. Intended to answer the layman's questions on all aspects of the subject. Photographs, diagrams, and color plates.

12977 Communication of Technical Information. Robert M. Dederich. 116 pages. 1952. Chemonomics, Inc., New York. T11 D36c)

Concerns the subject of reporting, from the viewpoint of the manager in business, to help the technical man orient himself in his industrial organization. Presents the problem of understanding the communicating process and considers the various means of transferring information. Bibliography.

12978 Giants of Geology. Carroll Lane Fenton and Mildred Adams Fenton. 333 pages. 1952. Doubleday & Co., Garden City, New York. (QE21 F36g)

Development of the science of the Earth, from ancient Greece to modern times, is traced through a fascinating series of biographical sketches of history's outstanding geologists. From the Greek Thales, who first advanced a theory of erosion, to the 20th century's Chamberlin, the lives and discoveries of the 39 greatest men in this field are related.

12979 Water. Cyril S. Fox. 148 pages. 1952. Philosophical Library, New York. (QD181.H1 F83w)

Initial volume of a series of books which Technical Press, Ltd., has in preparation or already published on the various aspects of water supply. Present volume provides an outline of the science of water, both in the academic and practical aspects of the subject, and includes details regarding its characteristics, its occurrence, and its utilization. Photographs, diagrams, and tables.

12980 The Economics of New England. Seymour E. Harris. 317 pages. 1952. Harvard University Press, Cambridge, Mass. (HC107.A11 H24e)

Presented as a case study of an older era and to furnish facts as a basis for improving the present economic situation. Comprises 7 parts (each composed of a number of chapters) covering: general problems; external economic relations; labor and related costs; fiscal policy; fuel costs and resource development; markets, transportation, and raw materials; and industrial structure. Index, tables, charts, and references.

12981 Showmanship in Public Speaking. Edward J. Hegarty. 236 pages. 1952. McGraw-Hill, New York. (PN4121 H36s)

Every speaker the author believes, should learn to put on an act or a show that will win and hold an audience. Shows how you can consciously develop persuasive speaking techniques that will insure increased audience response. Tells how to point up your subject matter by incorporating anecdotes, pertinent news items, funny stories, etc. Emphasizes the effectiveness of getting the audience into the act by stunts, demonstrations, skits, a question period, or a show of hands. Demonstrates how to enliven your language and how to use gestures and facial expressions to the best advantage. Includes information on testing material for its interest; handling notes, charts, props, and printed matter properly; overcoming nervousness and annoying outside disturbances; warming up a cold audience; and keeping listeners alert.

12982 How to Live and Work Successfully With People in Business. Harry Walker Hepner. 272 pages. 1952. Prentice-Hall, Inc., New York. (HF5386 H41h)

Drawing on his own personal and professional experiences, the author, a personnel and consumer relations consultant, outlines and explains the psychological principles which you can use to learn how to understand people, to overcome emotional tensions, to develop your personality, and to increase your mental efficiency. Separate chapters also tell how to get along with the boss, how to decide intelligently whether or not to change jobs, how to get a new job of the right kind, how to be an effective supervisor, and how to motivate people who work for you.

36. *Miscellaneous*

12983 An Explorer-Scientist's Pilgrimage: the Autobiography of William Herbert Hobbs. 222 pages. 1952. J. W. Edwards, Ann Arbor, Mich. (QE22 H65a)

The author is professor emeritus of geology, Univ. of Michigan; a world authority on glaciers, earthquakes, and volcanos; and acquainted with all the well-known explorers of the Arctic and Antaractic.

12984 Dictionary of Terms Used in the Theory and Practice of Mechanical Engineering. Ed. 7. J. G. Horner. 417 pages. 1952. Technical Press, Ltd., Surrey, England. (TJ9 H78d7)

12985 Fogs, Clouds, and Aviation. W. J. Humphreys. 200 pages. 1943. William & Wilkins Company, Baltimore. (QC915 H88f)

Written in very simple terms and profusely illustrated with exceptionally good black-and-white photographs. A short book, hence likely to be especially well received by the layman interested in atmospheric phenomena and meteorology, as well as by the aviator to whom the subject is of life-and-death importance.

12986 The Atmospheres of the Earth and Planets. Rev. Ed. Gerard P. Kuiper, editor. 434 pages. 1952. University of Chicago Press, Chicago. (QB505 K95a2)

With some exceptions the various contributors have brought their work up to date as of early 1951.

12987 Marginal Punched Cards in College and Research Libraries. Howard F. McGaw. 218 pages. 1952. Scarecrow Press, Washington. (HF5371 M17m)

Objectives of this book are, first, to provide a guidebook to the librarian just beginning his exploration of the uses of marginal punched cards; and, second, to call to the attention of those already working with such cards, some unfamiliar techniques and applications.

12988 Isotopes—A Five-Year Summary of United States Distribution. 451 pages. 1951. U. S. Atomic Energy Commission, Washington. (TK9145 Un3i)

A detailed account of isotope utilization during the first 5 years of the Commission's distribution programs. A useful reference, and documentary evidence of the value of radioactive and concentrated stable isotopes to modern research and technology in science, medicine, agriculture, and industry. Mainly consists of tables listing institution, worker, isotope, purpose, and status or reference for each use. 1400 ref.

12989* Who's Important in Medicine. Ed. 2. 1059 pages. 1952. Institute for Research in Biography, Hicksville, N. Y.

Contains more than 10,000 biographical sketches of notable physicians and surgeons in the U. S. and Canada. All biographies were revised and brought to date for this edition.

12990 Semiannual Report of the Atomic Energy Commission. 211 pages. 1952. U. S. Atomic Energy Commission, Washington. (UF767 Un3s)

Arranged in 3 parts: Major Activities in Atomic Energy Programs, July-Dec. 1951; Condensed AEC Annual Financial Report, Fiscal Year 1951; and Atomic Energy and Its Applications in Plant Science. Appendixes are included on such subjects as organization, regulation, and reports.

See also:
11643 (British cast iron research laboratories)
12262 (atomic power problems)
12617 (plastics in surgery)
12953 (water resources conference)

VOLUME 1, NUMBER 10 OCTOBER 1952